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TECHNICAL UNEMPLOYMENT

A number of sources are pointing out the interesting fact that Russia, once one of the world's most backward, nontechnical nations, is now training engineers and technicians faster than the United States—the most gadget-and-engineering nation of the world today. Indications are, moreover, that the Russian engineering courses are highly concentrated, thorough, and specialized.

I'd like to collect some other facts, seemingly unrelated, that may make a pattern—a pattern of the sort that's formed by half a dozen short line-segments, seemingly randomly oriented, that, if extended far enough, meet at a common point.

There's an item from one of Dr. E. E. Smith's stories, in which he made the point that if you know exactly what you want to do, and can state it precisely, you don't need to do it—a machine can do it for you.

There's the fact that I've heard

from a number of young men who started in physics, or chemistry, or . . . one of the physical sciences, and switched to psychology, sociology, anthropology—one of the undeveloped semi-sciences of the social group. Semingly, that's a rather peculiar line of behavior, if you stop to think of it. A man who's graduated with a degree in physics, from a good technical school, today does not have to *find* an employer; he has to *select* an employer. The pay in the engineering fields is high, the opportunities wide open. How come quite a few men are switching to the social sciences, where the going is anything but assured, and is apt to be tough sledding? Doesn't seem to be logical, does it?

Some years back, the mechanical refrigerator began replacing the iceman—and the refrigerator repair technicians began opening for business. That business, as of 1955, is practically a dead duck. There are

a lot more refrigerators now—and home freezers in addition—but there's no more repair business. The sealed-unit refrigerator mechanism did away with about ninety-five per cent of the need for repairs, and made the other five per cent impossible. You replace the unit instead of repairing it, when it does need correction.

During the war, radar was new, and radar technicians had to be trained, and there simply weren't enough. With radar becoming more and more widely used, the shortage of technicians of the required level began to indicate that the lack of technicians would be the factor that limited the use of the equipments, rather than lack of need for the systems. Currently, radar systems are being produced on the sealed-unit principle, with spare units that can be plugged in, rather than being repaired on shipboard.

The development of printed circuits, of course, is in the same direction; the whole circuit-unit can be designed for plug-in replacement. A machine can make a new unit much more cheaply than a trained technician can find and correct the specific fault.

There was a time when there were places that repaired mechanical pencils; now the pencils generally cost about twenty-five cents, and no one repairs them.

M. I. T. has been working on an electronic control system whereby a machine lathe can be automatically controlled by a punched tape fed

into a cybernetic unit, to cut such complex shapes as a cam. The gadget is in an early stage of development now; currently, however, a girl transcribes a standard engineering blueprint into punched-tape language for the cybernetic unit, and the control operates the lathe to turn out the specified shape.

The big field of repair and maintenance is being whittled at very efficiently by the plug-in unit system; previously it did seem that the repair and maintenance field was beyond the powers of machine invasion, because of the inherent limitation of the machine—it can do only what it has been exactly instructed to do. Therefore, it can do only the predicted-and-expected. By definition, a breakdown is unexpected. (Even including a fuse blowout; it was predicted that the fuse would blow out, of course, if the circuit was overloaded—but the fault that caused the overload wasn't!)

If you can state precisely what you want done—you don't have to do it. And a job a machine *can* do economically is not a proper job for a human being. Inasmuch as the essence of any "engineering science" is that it is highly, and reliably predictable in detail . . .

This does NOT include design engineering, research technology, nor theoretical-level science. But, at least theoretically, any true engineering-technician's job can be made a machine-job; it's basically predictable, or by sufficiently fine engineering

(Continued on page 161)



SENSE FROM THOUGHT DIVIDE

BY MARK CLIFTON

What is a "phony"? Someone who believes he can do X, when he can't, however sincerely he believes it? Or someone who can do X, believes he can't, and believes he is pretending he can?

Illustrated by van Dongen



"Remembrance and reflection,
how allied;
What thin partitions sense
from thought divide."

Pope

When I opened the door to my secretary's office, I could see her looking up from her desk at the Swami's face with an expression of fascinated skepticism. The Swami's back was toward me, and on it hung flowing folds of a black cloak. His turban was white, except where it had rubbed against the back of his neck.

"A tall, dark, and handsome man

will soon come into your life," he was intoning in that sepulchral voice men habitually use in their dealings with the absolute.

Sara's green eyes focused beyond him, on me, and began to twinkle.

"And there he is right now," she commented dryly. "Mr. Kennedy, Personnel Director for Computer Research."

The Swami whirled around, his heavy robe following the movement in a practiced swirl. His liquid black eyes looked me over shrewdly, and he bowed toward me as he vaguely touched his chest, lips and forehead. I expected him to murmur, "Effen-

di," or "Bwana Sahib," or something, but he must have felt silence was more impressive.

I acknowledged his greeting by pulling down one corner of my mouth. Then I looked at his companion.

The young lieutenant was standing very straight, very stiff, and a flush of pink was starting up from his collar and spreading around his clenched jaws to leave a semicircle of white in front of his red ears.

"Who are you?" I asked the lieutenant.

"Lieutenant Murphy," he answered shortly, and managed to open his teeth a bare quarter of an inch for the words to come out. "Pentagon!" His light gray eyes pierced me to see if I were impressed.

I wasn't.

"Division of Matériel and Supply," he continued in staccato, as if he were imitating a machine gun.

I waited. It was obvious he wasn't through yet. He hesitated, and I could see his Adam's apple travel up above the knot of his tie and back down again as he swallowed. The pink flush deepened suddenly into brilliant red and spread all over his face.

"Poltergeist Section," he said defiantly.

"What?" The exclamation was out before I could catch it.

He tried to glare at me, but his eyes were pleading instead.

"General Sanfordwaith said you'd understand." He intended to make it matter of fact in a sturdy, confident

voice, but there was the undertone of a wail. It was time I lent a hand before his forces were routed and left him shattered in hopeless defeat.

"You're West Point, aren't you?" I asked kindly.

It seemed to remind him of the old shoulder-to-shoulder tradition. He straightened still more. I hadn't believed it possible.

"Yes, sir!" He wanted to keep the gratitude out of his voice, but it was there. It did not escape my attention that, for the first time, he had spoken the habitual term of respect to me.

"Well, what do you have here, Lieutenant Murphy?" I nodded toward the Swami who had been wavering between a proud, free stance and that of a drooping supplicant. The lieutenant, whose quality had been recognized, even by a civilian, was restored unto himself. He was again ready to do or die.

"According to my orders, sir," he said formally, "you have requested the Pentagon furnish you with one half dozen, six, male-type poltergeists. I am delivering the first of them to you, sir."

Sara's mouth, hanging wide open, reminded me to close my own.

So the Pentagon was calling me on my bluff. Well, maybe they did have something at that. I'd see.

"Float me over that ash tray there on the desk," I said casually to the Swami.

He looked at me as if I'd insulted him, and I could anticipate some

reply to the effect that he was not applying for domestic service. But the humble supplicant rather than the proud and fierce hill man won. He started to pick up the ash tray from Sara's desk with his hand.

"No, no!" I exclaimed. "I didn't ask you to hand it to me. I want you to TK it over to me. What's the matter? Can't you even TK a simple ash tray?"

The lieutenant's eyes were getting bigger and bigger.

"Didn't your Poltergeist Section test this guy's aptitudes for telekinesis before you brought him from Washington all the way out here to Los Angeles?" I snapped at him.

The lieutenant's lips thinned to a bloodless line. Apparently I, a civilian, was criticizing the judgment of the Army.

"I am certain he must have qualified adequately," he said stiffly, and this time left off the "sir."

"Well, I don't know," I answered doubtfully. "If he hasn't even enough telekinetic ability to float me an ash tray across the room—"

The Swami recovered himself first. He put the tips of his long fingers together in the shape of a sway-backed steeple, and rolled his eyes upward.

"I am an instrument of infinite wisdom," he intoned. "Not a parlor magician."

"You mean that with all your infinite wisdom you can't do it," I accused flatly.

"The vibrations are not favora-

ble—" he rolled the words sonorously.

"All right," I agreed. "We'll go somewhere else, where they're better!"

"The vibrations throughout all this crass, materialistic Western world—" he intoned.

"All right," I interrupted, "we'll go to India, then. Sara, call up and book tickets to Calcutta on the first possible plane!" Sara's mouth had been gradually closing, but it unhinged again.

"Perhaps not even India," the Swami murmured, hastily. "Perhaps Tibet."

"Now you know we can't get admission into Tibet while the Communists control it," I argued seriously. "But how about Nepal? That's a fair compromise. The Maharajadhiraja's friendly now. I'll settle for Nepal."

The Swami couldn't keep the triumphant glitter out of his eyes. The sudden worry that I really would take him to India to see if he could TK an ash tray subsided. He had me.

"I'm afraid it would have to be Tibet," he said positively. "Nowhere else in all this troubled world are the vibrations—"

"Oh go on back to Flatbush!" I interrupted disgustedly. "You know as well as I that you've never been outside New York before in your life. Your accent's as phony as the pear-shaped tones of a midwestern garden club president. Can't even TK a simple ash tray!"

I turned to the amazed lieutenant.

"Will you come into my office?" I asked him.

He looked over at the Swami, in doubt.

"He can wait out here," I said. "He won't run away. There isn't any subway, and he wouldn't know what to do. Anyway, if he did get lost, your Army Intelligence could find him. Give G-2 something to work on. Right through this door, lieutenant."

"Yes, sir," he said meekly, and preceded me into my office.

I closed the door behind us and waved him over to the crying chair. He folded at the knees and hips, as if he were hinged only there, as if there were no hinges at all in the ramrod of his back. He sat up straight, on the edge of his chair, ready to spring into instant charge of battle. I went around back to my desk and sat down.

"Now, lieutenant," I said soothingly, "tell me all about it."

I could have sworn his square chin quivered at the note of sympathy in my voice. I wondered, irrelevantly, if the lads at West Point all slept with their faces confined in wooden frames to get that characteristically rectangular look.

"You knew I was from West Point," he said, and his voice held a note of awe. "And you knew, right away, that Swami was a phony from Flatbush."

"Come now," I said with a shrug. "Nothing to get mystical about. Patterns. Just patterns. Every en-

vironment leaves the stamp of its matrix on the individual shaped in it. It's a personnel man's trade to recognize the make of a person, just as you would recognize the make of a rifle."

"Yes, sir. I see, sir," he answered. But of course he didn't. And there wasn't much use to make him try. Most people cling too desperately to the ego-saving formula: Man cannot know man.

"Look, lieutenant," I said, with an idea that we'd better get down to business. "Have you been checked out on what this is all about?"

"Well, sir," he answered, as if he were answering a question in class, "I was cleared for top security, and told that a few months ago you and your Dr. Auerbach, here at Computer Research, discovered a way to create antigravity. I was told you claimed you had to have a poltergeist in the process. You told General Sanfordwaithe that you needed six of them, males. That's about all, sir. So the Poltergeist Division discovered the Swami, and I was assigned to bring him out here to you."

"Well then, Lieutenant Murphy, you go back to the Pentagon and tell General Sanfordwaithe that—" I could see by the look on his face that my message would probably not get through verbatim. "Never mind, I'll write it," I amended disgustedly. "And you can carry the message." Lesser echelons do not relish the task of repeating uncomplimentary words verbatim to a superior. Not usually.

I punched Sara's button on my intercom.

"After all the exposure out there to the Swami," I said, "if you're still with us on this crass, materialistic plane, will you bring your book?"

"My astral self has been hovering over you, guarding you, every minute," Sara answered dreamily.

"Can it take shorthand?" I asked dryly.

"Maybe I'd better come in," she replied.

When she came through the door the lieutenant gave her one appreciative glance, then returned to his aloof pedestal of indifference. Obviously his pattern was to stand in majestic splendor and allow the girls to fawn somewhere down near his shoes. These lads with a glamour boy complex almost always gravitate toward some occupation which will require them to wear a uniform. Sara catalogued him as quickly as I did, and seemed unimpressed. But you never can tell about a woman; the smartest of them will fall for the most transparent poses.

"General Sanfordwaithe, dear sir," I began as she sat down at one corner of my desk and flipped open her book. "It takes more than a towel wrapped around the head and some mutterings about infinity to get poltergeist effects. So I am returning your phony Swami to you with my compliments—"

"Beg your pardon, sir," the lieutenant interrupted, and there was a certain note of suppressed triumph in his voice. "In case you rejected

our applicant for the poltergeist job you have in mind, I was to hand you this." He undid a lovingly polished button of his tunic, slipped his hand beneath the cloth and pulled forth a long, sealed envelope.

I took it from him and noted the three sealing-wax imprints on the flap. From being carried so close to his heart for so long, the envelope was slightly less crisp than when he had received it. I slipped my letter opener in under the side flap, and gently extracted the letter without, in anyway, disturbing the wax seals which were to have guaranteed its privacy. There wasn't any point in my doing it, of course, except to demonstrate to the lieutenant that I considered the whole deal as a silly piece of cloak and dagger stuff.

After the general formalities, the letter was brief: "Dear Mr. Kennedy: We already know the Swami is a phony, but our people have been convinced that in spite of this there are some unaccountable effects. We have advised your general manager, Mr. Henry Grenoble, that we are in the act of carrying out our part of the agreement, namely, to provide you with six male-type poltergeists, and to both you and him we are respectfully suggesting that you get on with the business of putting the antigravity units into immediate production."

I folded the letter and tucked it into one side of my desk pad. I looked at Sara.

"Never mind the letter to General Sanfordwaithe," I said. "He has

successfully cut off my retreat in that direction." I looked over at the lieutenant. "All right," I said resignedly, "I'll apologize to the Swami, and make a try at using him."

I picked up the letter again and pretended to be reading it. But this was just a stall, because I had suddenly been struck by the thought that my extreme haste in scoring off the Swami and trying to get rid of him was because I didn't want to get involved again with poltergeists. Not any, of any nature.

The best way on earth to avoid having to explain psi effects and come to terms with them is simply to deny them, convince oneself that they don't exist. I sighed deeply. It looked as if I would be denied that little human privilege of closing my eyes to the obvious.

Old Stone Face, our general manager, claimed to follow the philosophy of building men, not machines. To an extent he did. His favorite phrase was, "Don't ask me how. I hired you to tell me." He hired a man to do a job, and I will say for him, he left that man alone as long as the job got done. But when a man flubbed a job, and kept on flubbing it, then Mr. Henry Grenoble stepped in and carried out his own job—general managing.

He had given me the assignment of putting antigrav units into production. He had given me access to all the money I would need for the purpose. He had given me sufficient time, months of it. And, in spite of

all this coöperation, he still saw no production lines which spewed out antigrav units at some such rate as seventeen and five twelfths per second.

Apparently he got his communication from the Pentagon about the time I got mine. Apparently it contained some implication that Computer Research, under his management, was not pursuing the cause of manufacturing antigrav units with diligence and dispatch. Apparently he did not like this.

I had no more than apologized to the Swami, and received his martyred forgiveness, and arranged for a hotel suite for him and the lieutenant, when Old Stone Face sent for me. He began to manage with diligence and dispatch.

"Now you look here, Kennedy," he said forcefully, and his use of my last name, rather than my first, was a warning. "I've given you every chance. When you and Auerbach came up with that antigrav unit last fall, I didn't ask a lot of fool questions. I figured you knew what you were doing. But the whole winter has passed, and here it is spring, and you haven't done anything that I can see. I didn't say anything when you told General Sanfordwaithe that you'd have to have poltergeists to carry on the work, but I looked it up. First I thought you'd flipped your lid, then I thought you were sending us all on a wild goose chase so we'd leave you alone, then I didn't know what to think."

I nodded. He wasn't through.

"Now I think you're just pretending the whole thing doesn't exist because you don't want to fool with it."

Perhaps he had come to the right decision after all. I'd resolutely washed the whole thing out of my mind. But I wasn't going to get away with it. I could see it coming.

"For the first time, Kennedy, I'm asking you what happened?" he said firmly, but his tone was more telling than asking. So I was going to have to discuss frameworks with Old Stone Face, after all.

"Henry," I asked slowly, "have you kept up your reading in theoretical physics?"

He blinked at me. I couldn't tell whether it meant yes or no.

"When we went to school, you and I—" I hoped my putting us both in the same age group would tend to mollify him a little, "physics was all snug, secure, safe, definite. A fact was a fact, and that's all there was to it. But there's been some changes made. There's the coördinate systems of Einstein, where the relationships of facts can change from framework to framework. There's the application of multivalued logic to physics where a fact becomes not a fact any longer. The astronomers talk about the expanding universe—it's a piker compared to man's expanding concepts about that universe."

He waited for more. His face seemed to indicate that I was beating around the bush.

"That all has a bearing on what happened," I assured him. "You

have to understand what was behind the facts before you can understand the facts themselves. First, we weren't trying to make an antigrav unit at all. Dr. Auerbach was playing around with a chemical approach to cybernetics. He made up some goop which he thought would store memory impulses, the way the brain stores them. He brought a plastic cylinder of it over to me, so I could discuss it with you. I laid it on my desk while I went on with my personnel management business at hand."

Old Stone Face opened a humidor and took out a cigar. He lit it slowly and deliberately and looked at me sharply as he blew out the first puff of smoke.

"The nursery over in the plant had been having trouble with a little girl, daughter of one of our production women. She'd been throwing things, setting things on fire. The teachers didn't know how she did it, she just did it. They sent her to me. I asked her about it. She threw a tantrum, and when it was all over, Auerbach's plastic cylinder of goop was trying to fall upward, through the ceiling. That's what happened," I said.

He looked at his cigar, and looked at me. He waited for me to tie the facts to the theory. I hesitated, and then tried to reassure myself. After all, we were in the business of manufacturing computers. The general manager ought to be able to understand something beyond primary arithmetic.

"Jennie Malasek was a peculiar child with a peculiar background," I went on. "Her mother was from the old country, one of the Slav races. There's the inheritance of a lot of peculiar notions. Maybe she had passed them on to her daughter. She kept Jennie locked up in their room. The kid never got out with other children. Children, kept alone, never seeing anybody, get peculiar notions all by themselves. Who knows what kind of a coördinate system she built up, or how it worked? Her mother would come home at night and go about her tasks talking aloud, half to the daughter, half to herself. 'I really burned that foreman up, today,' she'd say. Or, 'Oh, boy, was he fired in a hurry!' Or, 'She got herself thrown out of the place,' things like that."

"So what does that mean, Ralph?" he asked. His switch to my first name indicated he was trying to work with me instead of pushing me.

"To a child who never knew anything else," I answered, "one who had never learned to distinguish reality from unreality—as we would define it from our agreed framework—a special coördinate system might be built up where 'Everybody was up in the air at work, today,' might be taken literally. Under the old systems of physics that couldn't happen, of course—it says in the textbooks—but since it has been happening all through history, in thousands of instances, in the new systems of multivalued physics we recognize it. Under the old system,

we already had all the major answers, we thought. Now that we've got our smug certainties knocked out of us, we're just fumbling along, trying to get some of the answers we thought we had.

"We couldn't make that cylinder activate others. We tried. We're still trying. In ordinary cybernetics you can have one machine punch a tape and it can be fed into another machine, but that means you first have to know how to code and decode a tape mechanically. We don't know how to code or decode a psi effect. We know the Auerbach cylinder will store a psi impulse, but we don't know how. So we have to keep working with psi gifted people, at least until we've established some of the basic laws governing psi."

I couldn't tell by Henry's face whether I was with him or away from him. He told me he wanted to think about it, and made a little motion with his hand that I should leave the room.

I walked through the suite of executive offices and down a sound rebuffing hallway. The throbbing clatter of manufacture of metallic parts made a welcome sound as I went through the far doorway into the factory. I saw a blueprint spread on a foreman's desk as I walked past. Good old blueprint. So many millimeters from here to there, made of such and such an alloy, a hole punched here with an allowance of five-tenths plus or minus tolerance. Snug, secure, safe. I wondered if psi could ever be blue-



printed. Or suppose you put a hole here, but when you looked away and then looked back it had moved, or wasn't there at all?

Quickly, I got myself into a conversation with a supervisor about the rising rate of employee turnover in his department. That was something also snug, secure, safe. All you had to do was figure out human beings.

I spent the rest of the morning on such pursuits, working with things I understood.

On his first rounds of the afternoon, the interoffice messenger brought me a memorandum from the general manager's office. I

opened it with some misgivings. I was not particularly reassured.

Mr. Grenoble felt he should work with me more closely on the antigrav project. He understood, from his researches, that the most positive psi effects were experienced during a seance with a medium. Would I kindly arrange for the Swami to hold a seance that evening, after office hours, so that he might analyze the man's methods and procedures to see how they could fit smoothly into Company Operation. This was not to be construed as interference in the workings of my department but in the interests of pursuing the entire matter with diligence and dispatch—

The seance was to be held in my office.

I had had many peculiar conferences in this room—from union leaders stripping off their coats, throwing them on the floor and stomping on them; to uplifters who wanted to ban cosmetics on our women employees so the male employees would not be tempted to think Questionable Thoughts. I could not recall ever having held a seance before.

My desk had been moved out of the way, over into one corner of the large room. A round table was brought over from the salesmen's report writing room (used there more for surreptitious poker playing than for writing reports) and placed in the middle of my office—on the grounds that it had no sharp corners to gouge people in their middles if it got to cavorting about recklessly. In an industrial plant one always has to consider the matter of safety rules and accident insurance rates.

In the middle of the table there rested, with dark fluid gleaming through clear plastic cases, six fresh cylinders which Auerbach had prepared in his laboratory over in the plant.

Auerbach had shown considerable unwillingness to attend the seance; he pleaded being extra busy with experiments just now, but I gave him that look which told him I knew he had just been stalling around the last few months, the same as I had.

If the psi effect had never come out in the first place, there wouldn't have been any mental conflict. He

could have gone on with his processes of refining, simplifying and increasing the efficiency ratings of his goop. But this unexpected side effect, the cylinders learning and demonstrating something he considered basically untrue, had tied his hands with a hopeless sort of frustration. He would have settled gladly for a chemical compound which could have added two and two upon request; but when that compound can learn and demonstrate that there's no such thing as gravity, teaching it simple arithmetic is like ashes in the mouth.

I said as much to him. I stood there in his laboratory, leaned up against a work bench, and risked burning an acid hole in the sleeve of my jacket just to put over an air of unconcern. He was perched on the edge of an opposite work bench, swinging his feet, and hiding the expression in his eyes behind the window's reflection upon his polished glasses. I said even more.

"You know," I said reflectively, "I'm completely unable to understand the attitude of supposedly unbiased men of science. Now you take all that mass of data about psi effects, the odd and unexplainable happenings, the premonitions, the specific predictions, the accurate descriptions of far away simultaneously happening events. You take that whole mountainous mass of data, evidence, phenomena—"

A slight turn of his head gave me a glimpse of his eyes behind the

glasses. He looked as if he wished I'd change the subject. In his dry, undemonstrative way, I think he liked me. Or at least he liked me when I wasn't trying to make him think about things outside his safe and secure little framework. But I didn't give in. If men of science are not going to take up the evidence and work it over, then where are we? And are they men of science?

"Before Rhine came along, and brought all this down to the level of laboratory experimentation," I pursued, "how were those things to be explained? Say a fellow had some unusual powers, things that happened around him, things he knew without any explanation for knowing them. I'll tell you. There were two courses open to him. He could express it in the semantics of spiritism, or he could admit to witchcraft and sorcery. Take your pick; those were the only two systems of semantics which had been built up through the ages.

"We've got a third one now—parapsychology. If I had asked you to attend an experiment in parapsychology, you'd have agreed at once. But when I ask you to attend a seance, you balk! Man, what difference does it make what we call it? Isn't it up to us to investigate the evidence wherever we find it? No matter what kind of semantic debris it's hiding in?"

Auerbach shoved himself down off the bench, and pulled out a beatup package of cigarettes.

"All right, Kennedy," he had said resignedly, "I'll attend your seance."

The other invited guests were Sara, Lieutenant Murphy, Old Stone Face, myself, and, of course, the Swami. This was probably not typical of the Swami's usual audience composition.

Six chairs were placed at even intervals around the table. I had found soft white lights overhead to be most suitable for my occasional night work, but the Swami insisted that a blue light, a dim one, was most suitable for his night work.

I made no objection to that condition. One of the elementary basics of science is that laboratory conditions may be varied to meet the necessities of the experiment. If a red-lighted darkness is necessary to an operator's successful development of photographic film, then I could hardly object to a blue-lighted darkness for the development of the Swami's effects.

Neither could I object to the Swami's insistence that he sit with his back to the true North. When he came into the room, accompanied by Lieutenant Murphy, his thoughts seemed turned in upon himself, or wafted somewhere out of this world. He stopped in midstride, struck an attitude of listening, or feeling, perhaps, and slowly shifted his body back and forth.

"Ah," he said at last, in a tone of satisfaction, "there is the North!"

It was, but this was not particularly remarkable. There is no confus-

ing maze of hallways leading to the Personnel Department from the outside. Applicants would be unable to find us if there were. If he had got his bearings out on the street, he could have managed to keep them.

He picked up the nearest chair with his own hands and shifted it so that it would be in tune with the magnetic lines of Earth. I couldn't object. The Chinese had insisted upon such placement of household articles, particularly their beds, long before the Earth's magnetism had been discovered by science. The birds had had their direction-finders attuned to it, long before there was man.

Instead of objecting, the lieutenant and I meekly picked up the table and shifted it to the new position. Sara and Auerbach came in as we were setting the table down. Auerbach gave one quick look at the Swami in his black cloak and nearly white turban, and then looked away.

"Remember semantics," I murmured to him, as I pulled out Sara's chair for her. I seated her to the left of the Swami. I seated Auerbach to the right of him. If the lieutenant was, by chance, in cahoots with the Swami, I would foil them to the extent of not letting them sit side by side at least. I sat down at the opposite side of the table from the Swami. The lieutenant sat down between me and Sara.

The general manager came through the door at that instant, and took charge immediately.

"All right now," Old Stone Face

said crisply, in his low, rumbling voice, "no fiddle faddling around. Let's get down to business."

The Swami closed his eyes.

"Please be seated," he intoned to Old Stone Face. "And now, let us all join hands in an unbroken circle."

Henry shot him a beetlebrowed look as he sat down between Auerbach and me, but at least he was coöperative to the extent that he placed both his hands on top of the table. If Auerbach and I reached for them, we would be permitted to grasp them.

I leaned back and snapped off the overhead light to darken the room in an eerie, blue glow.

We sat there, holding hands, for a full ten minutes. Nothing happened.

It was not difficult to estimate the pattern of Henry's mind. Six persons, ten minutes, equals one man-hour. One man-hour of idle time to be charged into the cost figure of the antigrav unit. He was staring fixedly at the cylinders which lay in random positions in the center of the table, as if to assess their progress at this processing point. He apparently began to grow dissatisfied with the efficiency rating of the manufacturing process at this point. He stirred restlessly in his chair.

The Swami seemed to sense the impatience, or it might have been coincidence.

"There is some difficulty," he gasped in a strangulated, high voice. "My guides refuse to come through."

"Harrumph!" exclaimed Old Stone Face. It left no doubt about what he would do if his guides did not obey orders on the double.

"Someone in this circle is not a True Believer!" the Swami accused in an incredulous voice.

In the dim blue light I was able to catch a glimpse of Sara's face. She was on the verge of breaking apart. I managed to catch her eye and flash her a stern warning. Later she told me she had interpreted my expression as stark fear, but it served the same purpose. She smothered her laughter in a most unladylike sound somewhere between a snort and a squawk.

The Swami seemed to become aware that somehow he was not holding his audience spellbound.

"Wait!" he commanded urgently; then he announced in awe-stricken tones, "I feel a presence!"

There was a tentative, half-hearted rattle of some castanets—which could have been managed by the Swami wiggling one knee, if he happened to have them concealed there. This was followed by the thin squawk of a bugle—which could have been accomplished by sitting over toward one side and squashing the air out of a rubber bulb attached to a ten-cent party horn taped to his thigh.

Then there was nothing. Apparently his guides had made a tentative appearance and were, understandably, completely intimidated by Old Stone Face. We sat for another five minutes.

"Harrumph!" Henry cleared his

throat again, this time louder and more commanding.

"That is all," the Swami said in a faint, exhausted voice. "I have returned to you on your material plane."

The handholding broke up in the way bits of metal, suddenly charged positive and negative, would fly apart. I leaned back again and snapped on the white lights. We all sat there a few seconds, blinking in what seemed a sudden glare.

The Swami sat with his chin dropped down to his chest. Then he raised stricken, liquid eyes.

"Oh, now I remember where I am," he said. "What happened? I never know."

Old Stone Face threw him a look of withering scorn. He picked up one of the cylinders and hefted it in the palm of his hand. It did not fly upward to bang against the ceiling. It weighed about what it ought to weigh. He tossed the cylinder, contemptuously, back into the pile, scattering them over the table. He pushed back his chair, got to his feet, and stalked out of the room without looking at any of us.

The Swami made a determined effort to recapture the spotlight.

"I'm afraid I must have help to walk to the car," he whispered. "I am completely exhausted. Ah, this work takes so much out of me. Why do I go on with it? Why? Why? Why?"

He drooped in his chair, then made a valiantly brave effort to rise

under his own power when he felt the lieutenant's hands lifting him up. He was leaning heavily on the lieutenant as they went out the door.

Sara looked at me dubiously.

"Will there be anything else?" she asked. Her tone suggested that since nothing had been accomplished, perhaps we should get some work out before she left.

"No, Sara," I answered. "Good night. See you in the morning."

She nodded and went out the door.

Apparently none of them had seen what I saw. I wondered if Auerbach had. He was a trained observer. He was standing beside the table looking down at the cylinders. He reached over and poked at one of them with his forefinger. He was pushing it back and forth. It gave him no resistance beyond normal inertia. He pushed it a little farther out of parallel with true North. It did not try to swing back.

So he had seen it. When I'd laid the cylinders down on the table they were in random positions. During the seance there had been no jarring of the table, not even so much as a rap or quiver which could have been caused by the Swami's lifted knee. When we'd shifted the table, after the Swami had changed his chair, the cylinders hadn't been disturbed. When Old Stone Face had been staring at them during the seance—seance?, hah!—they were laying in inert, random positions.

But when the lights came back on, and just before Henry had picked

one up and tossed it back to scatter them, every cylinder had been laying in orderly parallel—and with one end pointing to true North!

I stood there beside Auerbach, and we both poked at the cylinders some more. They gave us no resistance, nor showed that they had any ideas about it one way or the other.

"It's like so many things," I said morosely. "If you do just happen to notice anything out of the ordinary at all, it doesn't seem to mean anything."

"Maybe that's because you're judging it outside of its own framework," Auerbach answered. I couldn't tell whether he was being sarcastic or speculative. "What I don't understand," he went on, "is that once the cylinders having been activated by whatever force there was in action—all right, call it psi—well, why didn't they retain it, the way the other cylinders retained the anti-grav force?"

I thought for a moment. Something about the conditional setup seemed to give me an idea.

"You take a photographic plate," I reasoned. "Give it a weak exposure to light, then give it a strong blast of overexposure. The first exposure is going to be blanked out by the second. Old Stone Face was feeling pretty strongly toward the whole matter."

Auerbach looked at me, unbelieving.

"There isn't any rule about who can have psi talent," I argued. "I'm just wondering if I shouldn't wire

General Sanfordwaithe and tell him to cut our order for poltergeists down to five."

I spent a glum, restless night. I knew, with certainty, that Old Stone Face was going to give me trouble. I didn't need any psi talent for that, it was an inevitable part of his pattern. He had made up his mind to take charge of this antigrav operation, and he wouldn't let one bogus seance stop him more than momentarily.

If it weren't so close to direct interference with my department, I'd have been delighted to sit on the side lines and watch him try to command psi effects to happen. That would be like commanding some random copper wire and metallic cores to start generating electricity.

For once I could have overlooked the interference with my department if I didn't know, from past experience, that I'd be blamed for the consequent failure. That's a cute little trick of top executives, generally. They get into something they don't understand, really louse it up, then, because it is your department, you are the one who failed. Ordinarily I liked my job, but if this sort of thing went too far—

But more than saving my job, I had the feeling that if I were allowed to go along, carefully and experimentally, I just might discover a few of the laws about psi. There was the tantalizing feeling that I was on the verge of knowing at least something.

The Pentagon people had been

right. The Swami was an obvious phony of the baldest fakery, yet he had something. He had something, but how was I to get hold of it? Just what kind of turns with what around what did you make to generate a psi force? It took two thousand years for man to move from the concept that amber was a stone with a soul to the concept of static electricity. Was there any chance I could find some shortcuts in reducing the laws governing psi? The one bright spot of my morning was that Auerbach hadn't denied seeing the evidence of the cylinders pointing North.

It turned out to be the only bright spot. I had no more than got to my office and sorted out the routine urgencies which had to be handled immediately from those which could be put off a little longer, when Sara announced the lieutenant and the Swami. So I put everything else off, and told her to send them right in.

The Swami was in an incoherent rage. The lieutenant was contracting his eyebrows in a scowl and clenching his fists in frustration. In a voice, soaring into the falsetto, the Swami demanded that he be sent back to Brooklyn where he was appreciated. The lieutenant had orders to stay with the Swami, but he didn't have any orders about returning either to Brooklyn or the Pentagon. I managed, at last, to get the lieutenant seated in a straight chair, but the Swami couldn't stay still long enough. He stalked up and down the room, swirling his slightly odor-

ous black cloak on the turns. Gradually the story came out.

Old Stone Face, a strong advocate of Do It Now, hadn't wasted any time. From his home he had called the Swami at his hotel and commanded him to report to the general manager's office at once. Apparently they both got there about the same time, and Henry had waded right in.

Apparently Henry, too, had spent a restless night. He accused the Swami of inefficiency, bungling, fraud, deliberate insubordination, and a few other assorted faults for having made a fool out of us all at the seance. He'd as much as commanded the Swami to cut out all this shillyshallying and get down to the business of activating antigrav cylinders, or else. He hadn't been specific about what the "or else" would entail.

It was up to me to pick up the pieces, if I could.

"Now I'm sure he really didn't mean—" I began to pour oil on the troubled waters. "With your deep insight, Swami—The fate of great martyrs throughout the ages—" Gradually the ego-building phrases calmed him down. He grew willing to listen, if for no more than the anticipation of hearing more of them.

He settled down into the crying chair at last, and I could see his valence shifting from outraged anger to a vast and noble forgiveness. This much was not difficult. To get him to coöperate, consciously and enthu-

sastically, well that might not be so easy.

Each trade has its own special techniques. The analytical chemist has a series of routines he tries when he wishes to reduce an unknown compound to its constituents. To the chemically uneducated, this may appear to be a fumbling, hit or miss, kind of procedure. The personnel man, too, has his series of techniques. It may appear to be no more than random, pointless conversation.

I first tried the routine process of reasoning. I didn't expect it to work; it seldom does, but it can't be eliminated until it has been tested.

"You must understand," I said slowly, soothingly, "that our intentions are constructive. We are simply trying to apply the scientific method to something which has, heretofore, been wrapped in mysticism."

The shocked freezing of his facial muscles told me that reasoning had missed its mark. It told me more.

"Science understands nothing, nothing at all!" he snapped. "Science tries to reduce everything to test tubes and formulae; but I am the instrument of a mystery which man can never know."

"Well, now," I said reasonably. "Let us not be inconsistent. You say this is something man was not meant to know; yet you, yourself, have devoted your life to gaining a greater comprehension of it."

"I seek only to rise above my material self so that I might place my-

self in harmony with the flowing symphony of Absolute Truth," he lectured me sonorously. Oh well, his enrapturement with such terminology differed little from some of the sciences which tended to grow equally esoteric. And maybe it meant something. Who was I to say that mine ears alone heard all the music being played?

It did mean one thing very specifically. There are two basic approaches to the meaning of life and the universe about us. Man can know: That is the approach of science, its whole meaning. There are mysteries which man was not meant to know: That is the other approach. There is no reconciling of the two on a reasoning basis. I represented the former. I wasn't sure the Swami was a true representative of the latter, but at least he had picked up the valence and the phrases.

I made a mental note that reasoning was an unworkable technique with this compound. Henry, a past master at it, had already tried threats and abuse. That hadn't worked. I next tried one of the oldest forms in the teaching of man, a parable.

I told him of my old Aunt Dimity, who was passionately fond of Rummy, but considered all other card games sinful.

"Ah, how well she proves my point," the Swami countered. "There is an inner voice, a wisdom greater than the mortal mind to guide us—"

"Well now," I asked reasonably, "why would the inner voice say that Rummy was O.K., but Casino

wasn't?" But it was obvious he liked the point he had made better than he had liked the one I failed to make.

So I tried the next technique. I tried an appeal for instruction. Often an opponent will come over to your side if you just confess, honestly, that he is a better man than you are, and you need his help. What was the road I must take to achieve the same understanding he had achieved? His eyes glittered at that, and a mercenary expression underlay the tone of his answer.

"First there is fasting, and breathing, and contemplating self," he murmured mendaciously. "I would be unable to aid you until you gave me full ascendancy over you, so that I might guide your every thought—"

I decided to try inspiration. In breaking down recalcitrant materials in the laboratory of my personnel office, sometimes one method worked, sometimes another.

"Do you realize, Swami," I asked, "that the one great drawback throughout the ages to a full acceptance of psi is the lack of permanent evidence? It has always been evanescent, perishable. It always rests solely upon the word of witnesses. But if I could show you a film print, then you could not doubt the existence of photography, could you?"

I opened my lower desk drawer and pulled out a couple of the Auerbach cylinders which we had used the night before. I laid them on top of the desk.

"These cylinders," I said, "act

like the photographic film. They will record, in permanent form, the psi effects you command. At last, for all mankind the doubt will be still-ed; man will at once know the truth; and you will take your place among the immortals."

I thought it was pretty good, and that, with his overweening ego, it would surely do the trick. But the Swami was staring at the cylinders first in fascination, then fear, then in horror. He jumped to his feet, without bothering to swirl his robe majestically, rushed over to the door, fumbled with the knob as if he were in a burning room, managed to get the door open, and rushed outside. The lieutenant gave me a puzzled look, and went after him.

I drew a deep breath, and exhaled it audibly. My testing procedures hadn't produced the results I'd expected, but the last one had revealed something else.

The Swami believed himself to be a fraud!

As long as he could razzle-dazzle with sonorous phrases, and depend upon credulous old women to turn them into accurate predictions of things to come, he was safe enough. But faced with something which would prove definitely—

Well, what would he do now?

And then I noticed that both cylinders were pointing toward the door. I watched them, at first, not quite sure; then I grew convinced by the change in their perspective with the angles of the desk. Almost



as slowly as the minute hand of a watch, they were creeping across the desk toward the door. They, too, were trying to escape from the room.

I nudged them with my fingers. They hustled along a little faster, as if appreciative of the help, even coming from me. I saw they were moving faster, as if they were learning as they tried it. I turned one of them around. Slowly it turned back and headed for the door again. I lifted one of them to the floor. It had no tendency to float, but it kept heading for the door. The other one fell off the desk while I was fooling with the first one. The jar didn't seem to bother it any. It, too, began to creep across the rug toward the door.

I opened the door for them. Sara looked up. She saw the two cylinders come into view, moving under their own power.

"Here we go again," she said, resignedly.

The two cylinders pushed themselves over the door sill, got clear outside my office. Then they went inert. Both Sara and I tried nudging them, poking them. They just lay there; mission accomplished. I carried them back inside my office and lay them on the floor. Immediately both of them began to head for the door again.

"Simple," Sara said dryly, "they just can't stand to be in the same room with you, that's all."

"You're not just whistling, gal," I answered. "That's the whole point."

"Have I said something clever?" she asked seriously.

I took the cylinders back into my office and put them in a desk drawer. I watched the desk for a while, but it didn't change position. Apparently it was too heavy for the weak force activating the cylinders.

I picked up the phone and called Old Stone Face. I told him about the cylinders.

"There!" he exclaimed with satisfaction. "I knew all that fellow needed was a good old-fashioned talking to. Some day, my boy, you'll realize that you still have a lot to learn about handling men."

"Yes, sir," I answered.

Sara asked me if I were ready to start seeing people, and I told her I wasn't, that I had some thinking to do. She quipped something about making the world wait, meaning that I should be occupying my time with personnel managing, and closed the door.

At that, Old Stone Face had a point. If he hadn't got in and riled things up, maybe the Swami would not have been emotionally upset enough to generate the psi force which had activated these new cylinders.

What was I saying? That psi was linked with emotional upheaval? Well, maybe. Not necessarily, but Rhine had proved that strength of desire had an effect upon the frequency index of telekinesis. Was there anything at all we knew about psi, so that we could start cataloguing?

ing, sketching in the beginnings of a pattern? Yes, of course there was.

First, it existed. No one could dismiss the mountainous mass of evidence unless he just refused to think about the subject.

Second, we could, in time, know what it was and how it worked. You'd have to give up the entire basis of scientific attitude if you didn't admit that.

Third, it acted like a sense, rather than as something dependent upon the intellectual process of thought. You could, for example—I argued to my imaginary listener—command your nose to smell a rose, and by autosuggestion you might think you were succeeding; that is, until you really did smell a real rose, then you'd know that you'd failed to create it through a thought pattern. The sense would have to be separated from the process of thinking about the sense.

So what was psi? But, at this point, did it matter much? Wasn't the main issue one of learning how to produce it, use it? How long did we work with electricity and get a lot of benefits from it before we formed some theories about what it was? And, for that matter, did we know what it was, even yet? "A flow of electrons" was a pretty meaningless phrase, when you stopped to think about it. I could say psi was a flow of positrons, and it would mean as much.

I reached over and picked up a cigarette. I started fumbling around in the center drawer of my desk for

a matchbook. I didn't find any. Without thinking, I opened the drawer containing the two cylinders. They were pressing up against the side of the desk drawer, still trying to get out of the room. Single purposed little beasts, weren't they?

I closed the drawer, and noticed that I was crushing out my cigarette in the ash tray, just as if I'd smoked it. It was the first overt indication I'd had that maybe my nerves weren't all they should be this morning.

The sight of the cylinders brought up the fourth point. Experimental psychology was filled with examples of the known senses being unable to make correct evaluations when confronted with a totally new object, color, scent, taste, sound, impression. It was necessary to have a point of orientation before the new could be fitted into the old. What we really lacked in psi was the ability to orient its phenomena. The various psi gifted individuals tried to do this. If they believed in guides from beyond the veil, that's the way they expressed themselves. On the other hand, a Rhine card caller might not be able to give you a message from your dear departed Aunt Minnie if his life depended upon it—yet it could easily be the same force working in both instances. Consequently, a medium, such as the Swami, whose basic belief was There Are Mysteries, would be unable to function in a framework where the obvious intent was to unveil those mysteries!

That brought up a couple more points. I felt pretty sure of them.

I felt as if I were really getting somewhere. And I had a situation which was ideal for proving my points.

I flipped the intercom key, and spoke to Sara.

"Will you arrange with her foreman for Annie Malasek to come to my office right now?" I asked. Sara is flippant when things are going along all right, but she knows when to buckle down and do what she's asked. She gave me no personal reactions to this request.

Yes, Annie Malasek would be a good one. If anybody in the plant believed There Are Mysteries, it would be Annie. Further, she was exaggeratedly loyal to me. She believed I was responsible for turning her little Jennie, the little girl who'd started all this poltergeist trouble, into a Good Little Girl. In this instance, I had no qualms about taking advantage of that loyalty.

While I waited for her I called the lieutenant at his hotel. He was in. Yes, the Swami was also in. They'd just returned. Yes, the Swami was ranting and raving about leaving Los Angeles at once. He had said he absolutely would have nothing more to do with us here at Computer Research. I told Lieutenant Murphy to scare him with tales of the secret, underground working of Army Intelligence, to quiet him down. And I scared the lieutenant a little by pointing out that holding a civilian against his will without the proper writ was tantamount to kidnaping.

So if the Army didn't want trouble with the Civil Courts, all brought about because the lieutenant didn't know how to handle his man—

The lieutenant became immediately anxious to coöperate with me. So then I soothed him. I told him that, naturally, the Swami was unhappy. He was used to Swami-ing, and out here he had been stifled, frustrated. What he needed was some credulous women to catch their breath at his awe-inspiring insight and gaze with fearful rapture into his eyes. The lieutenant didn't know where he could find any women like that. I told him, dryly, that I would furnish some.

Annie was more than coöoperative. Sure, the whole plant was buzzing about that foreign-looking Swami who had been seen coming in and out of my office. Sure, a lot of the Girls believed in seances.

"Why? Don't you, Mr. Kennedy?" she asked curiously.

I said I wasn't sure, and she clucked her tongue in sympathy. It must be terrible not to be sure, so . . . well, it must be just terrible. And I was such a kind man, too. I didn't quite get the connection, until I remembered there are some patterns which believe a human being would be incapable of being kind unless through hope of reward or fear of punishment.

But when I asked her to go to the hotel and persuade the Swami to give her a reading, she was reluctant. I thought my plan was going to be frustrated, but it turned out that her

reluctance was only because she did not have a thing to wear, going into a high-toned place like that.

Sara wasn't the right size, but one of the older girls in the outer office would lend Annie some clothes if I would let her go see the Swami, too. It developed that her own teacher was a guest of Los Angeles County for a while, purely on a trumped-up charge, you understand, Mr. Kennedy. Not that she was a cop hater or anything like that. She was perfectly aware of what a fine and splendid job those noble boys in blue did for us all, but—

In my own office! Well, you never knew.

Yet, what was the difference between her and me? We were both trying to get hold of and benefit by psi effects, weren't we? So I didn't comment. Instead, I found myself much farther ahead with my tentative plans than I'd anticipated at this stage.

Yes, my interviewer's teacher had quite a large following, and now they were all at loose ends. If the Swami were willing, she could provide a large and ready-made audience for him. She would be glad to talk to him about it.

Annie hurriedly said that she would be glad to talk to him about it, too; that she could get up a large audience, too. So, even before it got started, I had my rival factions at work. I egged them both on, and promised that I'd get Army Intelligence to work with the local boys in blue to hold off making any raids.

Annie told me again what a kind man I was. My interviewer spoke up quickly and said how glad she was to find an opportunity for expressing how grateful she was for the privilege of working right in the same department with such an understanding, really intellectually developed adult. She eyed Annie sidelong, as if to gauge the effects of her attempts to set me up on a pedestal, out of Annie's reach.

I hoped I wouldn't start believing either one of them. I hoped I wasn't as inaccurate in my estimates of people as was my interviewer. I wondered if she were really qualified for the job she held. Then I realized this was a contest between two women and I, a mere male, was simply being used as the pawn. Well, that worked both ways. In a fair bargain both sides receive satisfaction. I felt a little easier about my tactical maneuvers.

But the development of rivalry between factions of the audience gave me an additional idea. Perhaps that's what the Swami really needed, a little rivalry. Perhaps he was being a little too hard to crack because he knew he was the only egg in the basket.

I called Old Stone Face and told him what I planned. He responded that it was up to me. He'd stepped in and got things under way for me, got things going, now it was my job to keep them going. It looked as if he were edging out from under—or maybe he really believed that.

Before I settled into the day's

regular routine, I wired General Sanfordwaith, and told him that if he had any more prospects ready would he please ship me one at once, via air mail, special delivery.

The recital hall, hired for the Swami's Los Angeles debut, was large enough to accommodate all the family friends and relatives of any little Maribel who, having mastered "Daffodils In May," for four fingers, was being given to the World. It had the usual small stage equipped with pull-back curtains to give a dramatic flourish, or to shut off from view the effects of any sudden nervous catastrophe brought about by stage fright.

I got there, purposely a little late, in hopes the house lights would already be dimmed and everything in progress; but about a hundred and fifty people were milling around outside on the walk and in the corridors. Both factions had really been busy.

Most of them were women, but, to my intense relief, there were a few men. Some of these were only husbands, but a few of the men wore a look which said they'd been far away for a long time. Somehow I got the impression that instead of looking into a crystal ball, they would be more inclined to look out of one.

It was a little disconcerting to realize that no one noticed me, or seemed to think I was any different from anybody else. I supposed I should be thankful that I wasn't attracting any attention. I saw my

interviewer* amid a group of Older Girls. She winked at me roguishly, and patted her heavy handbag significantly. As per instructions, she was carrying a couple of the Auerbach cylinders.

I found myself staring in perplexity for a full minute at another woman, before I realized it was Annie. I had never seen her before, except dressed in factory blue jeans, man's blue shirt, and a bandana wrapped around her head. Her companion, probably another of the factory assemblers, nudged her and pointed, not too subtly, in my direction. Annie saw me then, and lit up with a big smile. She started toward me, hesitated when I frowned and shook my head, flushed with the thought that I didn't want to speak to her in public; then got a flash of better sense than that. She, too, gave me a conspiratorial wink and patted her handbag.

My confederates were doing nicely.

Almost immediately thereafter a horsefaced, mustached old gal started rounding people up in a honey sweet, pear shaped voice; and herded them into the gymnasium. I chose one of the wooden gym chairs in the back row.

A heavy jowled old gal came out in front of the closed curtains and gave a little introductory talk about how lucky we all were that the Swami had consented to visit with us. There was the usual warning to anyone who was not of the esoteric that we must not expect too much,

that sometimes nothing at all happened, that true believers did not attend just to see effects. She reminded us kittenishly that the guides were capricious, and that we must all help by merging ourselves in the great flowing currents of absolute infinity.

She finally faltered, realized she was probably saying all the things the Swami would want to say—in the manner of people who introduce speakers everywhere—and with a girlish little flourish she waved at someone off stage.

The house lights dimmed. The curtains swirled up and back.

The Swami was doing all right for himself. He was seated behind a small table in the center of the stage. A pale violet light diffused through a huge crystal ball on the table, and threw his dark features into sharp relief. It gave an astonishingly remote and inscrutable wisdom to his features. In the pale light, and at this distance, his turban looked quite clean.

He began to speak slowly and sonorously. A hush settled over the audience, and gradually I felt myself merging with the mass reaction of the rest. As I listened, I got the feeling that what he was saying was of tremendous importance, that somehow his words contained great and revealing wonders—or would contain them if I were only sufficiently advanced to comprehend their true meanings. The man was good, he knew his trade. All men search for truth at one level or another.

I began to realize why such a proportionate few choose the cold and impersonal laboratory. Perhaps if there were a way to put science to music—

The Swami talked on for about twenty minutes, and then I noticed his voice had grown deeper and deeper in tone, and suddenly, without any apparent transition, we all knew it was not really the Swami's voice we were hearing. And then he began to tell members of the audience little intimate things about themselves, things which only they should know.

He was good at this, too. He had mastered the trick of making universals sound like specifics. I could do the same thing. The patterns of people's lives have multiple similarities. To a far greater extent than generally realized the same things happen to everyone. The idea was to take some of the lesser known ones and word them so they seemed to apply to one isolated individual.

For instance, I could tell a fellow about when he was a little boy there was a little girl in a red dress with blond pigtails who used to scrap with him and tattle things about him to her mother. If he were inclined to be credulous, this was second sight I had. But it is a universal. What average boy didn't, at one time or another, know a little girl with blond pigtails? What blond little girl didn't occasionally wear a red dress? What little girl didn't tattle to her mother about the naughty things the boys were doing?



The Swami did that for a while. The audience was leaning forward in a rapture of ecstasy. First the organ tones of his voice soothed and softened. The phrases which should mean something if only you had the comprehension. The universals applied as specifics. He had his audience in the palm of his hand. He didn't need his crystal ball to tell him that.

But he wanted it to be complete. Most of the responses had been from women. He gave them the generalities which didn't sound like generalities. They confirmed with specifics. But most were women. He wanted the men, too. He began to concentrate on the men. He made it easy.

"I have a message," he said. "From . . . now let me get it right . . . from R. S. It is for a man in

this audience. Will the man who knew R. S. acknowledge?"

There was a silence. And that was such an easy one, too. I hadn't planned to participate, but, on impulse, since none of the other men were cooperating, I spoke up.

"Robert Smith!" I exclaimed.
"Good old Bob!"

Several of the women sitting near me looked at me and beamed their approval. One of the husbands scowled at me.

"I can tell by your tone," the Swami said, and apparently he hadn't recognized my tone, "that you have forgiven him. That is the message. He wants you to know that he is happy. He is much wiser now. He knows now that he was wrong."

One of the women reached over and patted me on the shoulder, giving me motherly encouragement.

But the Swami had no more mes-

sages for men. He was smart enough to know where to stop. He'd tried one of the simplest come-ons, and there had been too much of a pause. It had almost not come off.

I wondered who good old Bob Smith was? Surely, among the thousands of applicants I'd interviewed, there must have been a number of them. And, being applicants, of course some of them had been wrong.

The Swami's tones, giving one message after another—faster and faster now, not waiting for acknowledgment or confirmation—began to sink into a whisper. His speech became ragged, heavy. The words became indistinguishable. About his head there began to float a pale, luminescent sphere. There was a subdued gasp from the audience and then complete stillness. As though, unbreathing, in the depths of a tomb, they watched the sphere. It bobbed about, over the Swami's head and around him. At times it seemed as if about to float off stage, but it came back. It swirled out over the audience, but not too far, and never at such an angle that the long, flexible dull black wire supporting it would be silhouetted against the glowing crystal ball.

Then it happened. There was a gasp, a smothered scream. And over at one side of the auditorium a dark object began bobbing about in the air up near the ceiling. It swerved and swooped. The Swami's luminescent sphere jerked to a sudden stop. The Swami sat with open mouth and

stared at the dark object which he was not controlling.

The dark object was not confined to any dull black wire. It went where it willed. It went too high and brushed against the ceiling.

There was a sudden shower of coins to the floor. A compact hit the floor with a flat spat. A handkerchief floated down more slowly.

"My purse!" a woman gasped. I recognized my interviewer's voice. Her purse contained two Auerbach cylinders, and they were having themselves a ball.

In alarm, I looked quickly at the stage, hoping the Swami wasn't astute enough to catch on. But he was gone. The audience, watching the bobbing purse, hadn't realized it as yet. And they were delayed in realizing it by a diversion from the other side of the auditorium.

"I can't hold it down any longer, Mr. Kennedy!" a woman gasped out. "It's taking me up into the air!"

"Hold on, Annie!" I shouted back. "I'm coming!"

A chastened and subdued Swami sat in my office the following morning, and this time he was inclined to be cooperative. More, he was looking to me for guidance, understanding, and didn't mind acknowledging my ascendancy. And, with the lieutenant left in the outer office, he didn't have any face to preserve.

Later, last night, he'd learned the truth of what happened after he had run away in a panic. I'd left a call at the hotel for the lieutenant. When

the lieutenant had got him calmed down and returned my call, I'd instructed the lieutenant to tell the Swami about the Auerbach cylinders; to tell the Swami he was not a fake after all.

The Swami had obviously spent a sleepless night. It is a terrible thing to have spent years perfecting the art of fakery, and then to realize you needn't have faked at all. More terrible, he had swallowed some of his own medicine, and was overcome with fear of the forces which he had been commanding. All through the night he had shivered in fear of some instant and horrible retaliation. For him it was still a case of There Are Mysteries.

And it was of no comfort to his state of mind right now that the four cylinders we had finally captured last night were, at this moment, bobbing about in my office, swooping and swerving around in the upper part of the room, like bats trying to find some opening. I was giving him the full treatment. The first two cylinders, down on the floor, were pressing up against my closed door, like frightened little things trying to escape a room of horror.

The Swami's face was twitching, and his long fingers kept twining themselves into King's X symbols. But he was sitting it out. He was swallowing some of the hair of the dog that bit him. I had to give him A for that.

"I've been trying to build up a concept of the framework wherein psi seems to function," I told him

casually, just as if it were all a formalized laboratory procedure. "I had to pull last night's stunt to prove something."

He tore his eyes away from the cylinders which were over exploring one corner of the ceiling, and looked at me.

"Let's go to electricity," I said speculatively. "Not that we know psi and electricity have anything in common, other than some similar analogies, but we don't know they don't. Both of them may be just different manifestations of the same thing. We don't really know why a magnetized core, turning inside a coil of copper wire, generates electricity.

"Oh we've got some phrases," I acknowledged. "We've got a whole structure of phrases, and when you listen to them they sound as if they ought to mean something—like the phrases you were using last night. Everybody assumes they do mean something to the pundits. So, since it is human to want to be a pundit, we repeat these phrases over and over, and call them explanations. Yet we do know what happens, even if we do just theorize about why. We know how to wrap something around something and get electricity.

"Take the induction coil," I said. "We feed a low-voltage current into one end, and we draw off a high-voltage current from the other. But anyone who wants, any time, can disprove the whole principle of the induction coil. All you have to do is wrap your core with a nonconductor, say nylon thread, and presto, noth-

ing comes out. You see, it doesn't work; and anybody who claims it does is a faker and a liar. That's what happens when science tries to investigate psi by the standard methods.

"You surround a psi-gifted individual with nonbelievers, and probably nothing will come out of it. Surround him with true believers; and it all seems to act like an induction coil. Things happen. Yet even when things do happen, it is usually impossible to prove it.

"Take yourself, Swami. And this is significant. First we have the north point effect. Then those two little beggars trying to get out the door. Then the ones which are bobbing around up there. Without the cylinders there would have been no way to know that anything had happened at all.

"Now, about this psi framework. It isn't something you can turn on and off, at will. We don't know enough yet for that. Aside from some believers and those individuals who do seem to attract psi forces, we don't know, yet, what to wrap around what. So, here's what you're to do: You're to keep a supply of these cylinders near you at all times. If any psi effects happen, they'll record it. Fair enough?

"Now," I said with finality. "I have anticipated that you might refuse. But you're not the only person who has psi ability. I've wired General Sanfordwaithe to send me another fellow; one who will coöperate."

The Swami thought it over. Here he was with a suite in a good hotel; with an army lieutenant to look after his earthly needs; on the payroll of a respectable company; with a ready-made flock of believers; and no fear of the bunco squad. He had never had it so good. The side money, for private readings alone, should be substantial.

Further, and he watched me narrowly, I didn't seem to be afraid of the cylinders. It was probably this which gave the clincher.

"I'll coöperate," he agreed meekly.

For three days there was nothing. The Swami seemed coöperative enough. He called me a couple times a day and reported that the cylinders just lay around his room. I didn't know what to tell him. I recommended he read biographies of famous mediums. I recommended fasting, and breathing, and contemplating self. He seemed dubious, but said he'd try it.

On the morning of the third day, Sara called me on the intercom and told me there was another Army lieutenant in her office, and another charac . . . another gentleman. I opened my door and went out to Sara's office to greet them. My first glimpse told me Sara had been right the first time. He was a character.

The new lieutenant was no more than the standard output from the same production line as Lieutenant Murphy, but the wizened little old man he had in tow was from a different and much rarer matrix. As

fast as I had moved, I was none too soon. The character reached over and tilted up Sara's chin as I was coming through the door.

"Now you're a healthy young wench," he said with a leer. "What are you doing tonight, baby?" The guy was at least eighty years old.

"Hey, you, pop!" I exclaimed in anger. "Be your age!"

He turned around and looked me up and down.

"I'm younger, that way, than you are, right now!" he snapped.

A disturbance in the outer office kept me from thinking up a retort. There were some subdued screams, some scuffling of heavy shoes, the sounds of some running feet as applicants got away. The outer door to Sara's office was flung open.

Framed in the doorway, breast high, floated the Swami!

He was sitting, cross-legged, on a hotel bathmat. From both front corners, where they had been attached by loops of twine, there peeked Auerbach cylinders. Two more rear cylinders were grasped in Lieutenant Murphy's strong hands. He was propelling the Swami along, mid air, in Atlantic City Boardwalk style.

The Swami looked down at us with aloof disdain, then his eyes focused on the old man. His glance wavered; he threw a startled and fearful look at the cylinders holding up his bathmat. They did not fall. A vast relief overspread his face, and he drew himself erect with more

disdain than ever. The old man was not so aloof.

"Harry Glotz!" he exclaimed. "Why you . . . you faker! What are you doing in that getup?"

The Swami took a casual turn about the room, leaning to one side on his magic carpet as if banking an airplane.

"Peasant!" He spat the word out and motioned grandly toward the door. Lieutenant Murphy pushed him through.

"Why, that no good bum!" the old man shouted at me. "That no-good from nowhere! I'll fix him! Thinks he's something, does he? I'll show him! Anything he can do I can do better!"

His rage got the better of him. He rushed through the door, shaking both fists above his white head, shouting imprecations, threats, and pleading to be shown how the trick was done, all in the same breath. The new lieutenant cast a stricken look at us and then sped after his charge.

"Looks as if we're finally in production," I said to Sara.

"That's only the second one," she said mournfully. "When you get all six of them, this joint's sure going to be jumping!"

I looked out of her window at the steel and concrete walls of the factory. They were solid, real, secure; they were a symbol of reality, the old reality a man could understand.

"I hope you don't mean that literally, Sara," I answered dubiously.

THE END



A FINE FIX

BY R. C. NOLL

Generally speaking, human beings are fine buck-passers—but there's one circumstance under which they refuse to pass on responsibility. If the other fellow says "Your method won't solve the problem!"—then they get mad!

Illustrated by van Dongen

The leader climbed sharply in a bank to the left, and the two others followed close behind. Their jet streams cut off at very near the same time. Before their speed slowed to stalling, the rotors unfolded from the canopy hump and beat the air viciously, the steam wisping back in brief fingers.

Under power again, they dipped playfully in tightening circles toward the plot-mottled earth. The fields expanded beneath them, and the leader brought up and hovered over a farm road whose dust already stirred in the disturbed air.

They settled as one in the rolling dust clouds from which emerged a covered figure who had driven the battered pickup truck to meet them.

"Y'sure got back in a rush," he

addressed the major, who was just jumping from the plastiglas cabin.

The major nodded and put his attention on seeing that the general descended safely. He then indicated the farmer.

"He's the one," the major said.

The general grunted socially.

Taking the opening, the farmer said, "Out there in the wheat, general." His tone carried eager importance. "My kid saw the light come down this morning feedin' the chickens. I felt the ground jump, too. Called the sheriff, first off."

"All right, you were a hero," said the general shortly. "Now, Grant, will you take me to it? I can't mess around here all day."

The party of six men, two of them technicians, waded into the field from the road. The farmer remained to watch, frowning.

When they had progressed well into the wheat, he shouted after them ruefully, "And watch where you're steppin', too!"

The group paused on the rim of newly gouged earth, clods and dirt that had splashed from the center of the crater. It was nearly four feet deep. The man the major had left on guard had uncovered more of the blackened object, which lay three-quarters exposed and showed a warped but cylindrical shape.

"Let's have a counter on it," the general ordered.

A technician slid into the crater and swept the metal with his instrument. The needle swung far over and stuck.

To the other technician the general said, "Get a chunk for verification of the alloy." He kicked a small avalanche of dirt down the crater side and turned back to the road, adding, "Although I don't know why the formality. Even a cadet could see that's an atomjet reactor, beat up as it is."

The major absorbed the jibe without comeback. An hour ago he had informed the general of his indecision over the object's identity, though he had suspected it to be the reactor.

"We may find more when we get it examined in the shop," the general mused, swishing by the wheat. "But at least we know they do come down some place, and it wasn't flash fusion. On this one, anyway."

"What do you think about instituting a search of this vicinity for other parts, general?"

The officer growled negatively. "Obviously, the reactor was the only part not vaporized in the fall—because of its construction."

"That's assuming the ship entered the atmosphere at operational velocity and not less than free fall," the major qualified.

"How can anyone assume free fall? Way outside probability."

"Yes, sir, but there are degrees of velocity involved. He could have used reverse thrust and entered at a relatively slow speed."

"All right, all right—let's say possible, then. Pull off your search if you want to. I'm in this thing so deep now, I'll try anything to get

going. I've got Congress ready to investigate, and some senator yesterday put pressure on to cancel the United Nuclear contract. I'll try anything at this point, Grant!"

The big man's voice had risen to anger, but Major Grant Reis had not missed the vocal breaking in the last syllables.

"I'm First Lieutenant Ashley and I've an appointment to see General Morrison."

The adjutant said, "Sorry, but you'll have to wait a little longer. The general's unexpectedly busy."

"My appointment was over an hour ago."

"Another half-hour and you can go in."

"Another half-hour and I'll go."

"It's your bar."

The lieutenant plopped back into a chair just as Grant strode swiftly past the adjutant's desk from the private office.

"Major," the adjutant asked, "how long is the general going to be tied up? He won't let me in the conference and the lieutenant here is supposed to see him."

Grant paused at the opposite door and pointing two thumb-and-forefinger guns at his head exploded them. The adjutant groaned understandingly. Even the first lieutenant caught on.

"Major, it's pretty important," the waiting officer said, standing again. Grant shifted his attention.

"Look, lieutenant—" Grant bot-tled the sarcasm behind his sudden-

ly lax mouth. He saw a first lieutenant's uniform, but it bulged aesthetically; and he saw a first lieutenant's cap and bar, but it sat rakishly on puffed-up brown curls.

"If you'll just look at these papers, major, you'll understand. I strated in from the Pentagon this morning," she said crisply.

Though it was Grant's turn to say something, he found too much of his concentration on her challenging brown eyes and the efficient down-sweep of her half-pouting mouth, plus a nub of a nose that pointed proudly upwards with the tilt of her head. In a temporary defensive maneuver, Grant took the papers handed him.

The borders were marked CONFIDENTIAL and the attached signatures would have impressed even the general. The subject—he might have expected — ATOMJET PATROL LOSSES.

"Er . . . look, lieutenant— What was it?" Grant glanced down at the papers.

"First Lieutenant Bridget Ashley."

"Look, Lieutenant Ashley, the general's been getting nothing but troubles all day. For your sake and his sake, I suggest you come back tomorrow, huh?" Grant handed back the papers and put a hand on her elbow, but she jerked back.

"Major, I've been given a great deal of responsibility in this assignment," she flared, "and it's important for me to get work started at once. I was led to understand these

patrol losses constituted a fairly urgent matter."

Grant glanced ominously toward the general's door. "Lieutenant, I'm trying to explain to you that it's in your best interests to take this up with him tomorrow. I'm one of his aides and I know him. I realize you're authorized to see him today, but—"

"Then I'll wait." She reseated herself and emphatically crossed her legs—a motion not escaping Grant's notice.

The adjutant and Grant mutually shrugged at each other, and Grant headed outside, saying over his shoulder, "I'll be back in a minute."

As it developed, it was far more than a minute; but whatever it was, when Grant returned she was gone. The major looked at the adjutant, and the adjutant indicated the general's door with an apprehensive nod. Grant bit his lip and entered the private office.

He had expected to hear the general's bass raging, but through the inner door came the strident tones of the lieutenant's modulating contralto. He had expected to see the general towering over the girl's shrinking figure, but as he entered she was bent earnestly in the middle, and the top of her torso inclined toward General Morrison, who had tilted as far back as his swivel chair would permit.

". . . So, if you haven't isolated any mechanical causation, how can you be sure it's mechanical?" she

was laying it on. "And if you're not sure it's mechanical, how can you suggest there's no possibility of psychological causation? The authorities that sent me here have not only considered the possibility, they feel it's quite probable. All I am requesting, sir, is immediate implementation of my authority so your investigation can be broadened. It's really to your benefit that—"

Grant said, "Lieutenant Ashley."

". . . My work be started at once so as to catch up on what findings you have obtained in the—"

Grant shouted, "Lieutenant Ashley!"

". . . Investigation so far in the mechanical aspects. It's not unlikely that a combining factor, both psychological and mechanical—"

Grant yelled, "LIEUTENANT ASHLEY!!!"

"Yes, sir, major."

"Would you please wait in the outer office for just a moment."

"But—"

"For just a moment, lieutenant."

"Yes, sir."

Grant waited until the door closed before he tried communication with the general. The officer still teetered in his chair, his eyes bulging from his reddened face.

"They sent me a shape," he sputtered. "That I could take. Shapes I don't mind, even with authority. But this one— You know where she's from, Grant?"

Grant sighed hopelessly.

"She's from syk," the general was beginning to roar, "with a blank

check of authority from Washington. She stood there and called the losses pilot-error. My pilots, Grant, the ones I trained!"

"Just a possibility, she meant," soothed Grant.

"Possibility, hell! With that attitude around Mojave we'll never get anywhere in this investigation." He untilted with a crash. "I want her kept away from me, do you hear? Give her anything she wants—but appointments with me. I've got United Nuclear here for stress tests, coolant analyses, radiation metering in the morning just as a start, and I'm not going to have that shape around fusing up the works."

"I'll see what I can do, sir."

"You're right you will, I'm putting Colonel Sorenson in as G-2, and you're going to be the new Syk Coördinator for the duration of this investigation!"

"The what?"

"You heard me."

"It couldn't be that bad, general," Grant grumbled.

"It is."

"Baby-sitting."

The general stood up from his desk. "No, you'll relay any data she may turn up to me, and you'll see she gets what supplies and personnel she may need. Look, Washington thinks we need her, so I take orders. And so do you, Grant. I'll have a special order out this afternoon."

"Yes, sir," Grant saluted and wheeled, grinding his molars.

With dubious explanations, Grant

managed to steer Lieutenant Ashley toward the Officers' Club. What excuses he gave her evidently had some effect; after the first fifty yards across the drill ground she steered easily, though still under vocal protest.

A drink, and Grant felt he could face the future. They sat in a plastic-weave booth, one against the far wall that overlooked through a curved window the blasting circle.

So wrapped up with his own feelings, Grant had been unaware of his companion's. Her face had paled, and she stirred her drink absently. The reflections in her eyes were over-bright with moisture.

Offered Grant: "The general has a lot on his mind."

"Yeah," she choked.

"The losses have upset him pretty bad."

"I notice. Me, too."

"Take a drink."

She sipped one CC and said, "And syk upsets him."

Grant smiled, "And shapes."

"And I suppose the rank of first lieutenant makes him nervous."

"No," Grant chuckled, "he can take or leave that. It's majors that get him."

She smiled vaguely, so Grant followed up with: "What's your background?"

"Psychometrics. Got a doctorate in it. I thought it might be valuable to the Air Force—at one time." She sipped two CCs.

"I've a little syk background," Grant said. She looked up in sudden

interest. "Started to major in it until I ran up against some of the profs. If this is what syk produces, I decided, it's not for me. Changed to engineering then. Unfortunately, the general knows about my record."

"How did he take it out on you, parade duty?"

"Worse. He made me an aide."

The girl leaned on an elbow and regarded him with her chin in her hand. "You bring his slippers?"

"As G-2, I did up until quarter of an hour ago. I've been promoted. Meet the Base Mojave Syk Coördinator."

Putting her nose in her drink, she giggled softly. "What is it he wants coöordinated, the syk or me?"

"You're on bearing," he laughed. "My name's Grant."

His hand went across the table, opened, and waited.

"Bridget," she said, and her hand fell into his in a handshake which lingered slightly.

At Grant's insistence they jeep-toured the base. To his surprise Bridget took interest in the installations, but asked most of her questions around the atomjet hangars.

"I've never seen one close," she hinted.

Grant flashed his Security card at the guards and they went in. She strolled about the tapering, snub-winged craft, apparently inspecting it closely. Grant's thought was that she felt she had to dramatize understanding something about Air Force rocketry.

After a short silence Bridget asked, "What is the compensating factor for the reactor's being placed off the center of stability?"

Grant blinked. "What's that again?"

She swung a pointed finger at the ship. "Naturally," she interrupted, "the nose will float downward in the canal, hoisting the hot tubes out of the liquid at the end of the glide-ins. But you've got pilot, power plant, and wings frontside. How can you affect glide-ins at surface air density without nosing in?"

The major decided she must have been reading the latest confidential files. High-viscosity liquid landing canals constituted a subject recent enough to be security and important enough not to be bandied about outside engineering and Base Mojave.

"Well, you see," Grant cleared his throat, "there're the fuel tanks along the back of the blast chamber, partly lead—"

"The tanks usually are nearly empty for glide-ins," she reminded.

Grant frowned. "Yes, usually empty, but still a weight factor. Then there's the automatic wing stabilizer that adjusts to the air speed and density and acts to pull up the nose—"

"O.K.," she interrupted. "Now, would you lift me through the canopy, please? I'd like to sit inside a minute."

"That's out," he said. "Only pilots and technicians."

"All right, if you won't, I'll get

up myself." She marched over to the hangar wall and pulled over boarding steps, which were braced on three pivotal tires.

"Bridget, Security says pilots and mechanics."

"And you're forgetting why I'm here, and besides that you're supposed to coördinate. Right now you're uncoördinating."

Before Grant's eyes flashed the memory of her orders with the signatures at the bottom. She was already climbing the steps.

"Just don't touch anything, that's all," he conciliated, following her up. Her seams were straight, he noted.

Bridget thudded into the narrow pilot's seat and wiggled herself into a comfortable position.

"Awful crowded," she smiled up at Grant.

"I hope you tore your nylons," he groused.

"Now, if you'll just explain these gadgets," she said, moving her hand over the panel embedded with digitrimmed dials.

"Hands off, please."

"By your reaction, I would say you don't know what some of them are," she counter-fired, and tossed her protruding bunch of curls.

Grant took the bait. He leaned into the canopy and with an overstiffened index finger pointed forcefully at each gauge. For more than a quarter-hour this went on, with Bridget pitching questions—most of which he juggled.

She seemed to show more interest in the radar screen, the navigational equipment, and the communications system. About these, she milked Grant's available knowledge until he felt like reaching down and throwing open the reactor valve and fuel switch.

"Lieutenant, if you don't mind, my back is paralyzed. Let's go back to the club and I'll answer anything you want."

"Just one more," she coaxed. "This crosshair sight with the little black circle in the middle. How does that work again?"

Grant straightened up and carefully massaged the small of his back. "It's for precise manual navigation if you need it. You sit up straight and sight through it."

"And what do you sight at?"

"A star, of course."

"Put it in the little black circle?"

"An A for you. Then you snap in Automatic Navigational and you're in business. Or you can navigate manually by using Gyroscopic Navigational if you want."

"I'm ready to get out now." Bridget lifted her hands where Grant stood on the platform of the boarding device.

Back or no back, Grant couldn't resist the opportunity. He pulled her by the hands to where she was leaning out the opened canopy, then he stooped and grabbed her under the arms and swung her up. For a moment her soft hair brushed his ear, and a light scent from her neck suggested he keep her pliant form



close to him a little longer than necessary.

He planted her next to the steps, and she muttered an uninspired thank you. But halfway down, she halted and turned.

"It's much easier asking me out dancing, Grant," she smiled impishly, and clacked across the hangar floor toward the jeep.

By the next morning arrangements for a small staff and office space had swiftly gone through. Working through lunch, Bridget had the office set up and the staff briefed and researching when Grant returned from dining with the general.

"You're just in time," she said,

looking up from an already cluttered desk. "I'm ready now to scan through any G-2 you have on atom-jet operation in your Mojave files."

Grant bristled. "These files are under the general's nose, and I don't think he'd appreciate—" He broke off when he observed Bridget tapping her pencil and frowning at him impatiently.

With a degree of diplomacy he had to admire, Grant lifted the non-technical files from the general's office and furtively smuggled them out in his brief case.

"Don't take all day," he warned, handing them to Bridget. "Part of my job is keeping the general neutral about you, and not against."

Bridget jumped up and drew another chair up to her desk. "How about scanning with me? That'll get the files back faster. Here, take these on pilot training."

The files repulsed him less than Bridget attracted him, and he sat down promptly. "And what do I look for, psychologically significant portions, is that it?"

"Even psychologically insignificant portions, major, if you please."

Grant began to read. As he scanned the copies of directives, reports, operations logs, and procedures the process became automatic, and part of his consciousness turned contemplative.

Three months ago he would have considered the situation in which he now found himself a future development out of the question. Mojave had brimmed with optimism and pride and accomplishment and eagerness. Base Mojave loomed vital in national defense, constituted a main element of national scientific pride.

From the dusty desert stretches the sprawling, efficient base had taken shape while United Nuclear had yet to assemble an atomjet. The schedules came out perfectly, and the first single-manned fusion-propulsed rocketplane thundered off the corporation proving grounds and glided into Base Mojave as planned. Designed for patrol of the mesosphere, the ships were to have gained for the West control of near-Earth space, besides affording superior observation posts for Eastern developments and activity of a space nature.

Training of the pilots had lasted thirty weeks and went by without a casualty or serious damage. Testing and re-testing of the electronics brought out no flaws. Stress and thermal analyses held up under all conditions imposed.

The losses began after the third week of patrol. UNR-6 failed to return to base—with no hint of the cause, with no communication from the pilot. That one was hushed up by the base PR officer, but news of the second reached the press. During the fifth week, UNR-2 never returned for its glide-in, and, of course, the first loss came out at that time, too.

General Morrison worked with the pilots and engineers steadily on the problem with apparent good results—for a month. Then UNR-9 vanished.

Lately the orders had been for patrol over the States, and it was presumed UNR-9 would have made an appearance somewhere had it been in trouble. That's why the Dakota farmer's report had been investigated so swiftly.

As of now, the situation had become one patrol a day with reluctant pilots, Congress sending a committee to the base, a taxpayer's injunction against the Air Force rocketplane operation, and United Nuclear men experimenting hourly with robot-piloted atomjets at all altitudes below four hundred miles.

Plus the syk research, naturally. Bridget's ash tray spilled over with right-angled cigarette butts, half-

burned. Grant studied her as she read through the files intently although her eyes rolled his way briefly on occasion. She faced him with an unexpected snap of the head.

"Well?"

"Just looking," Grant explained.

"Then just look for a pilot's manual. It's been mentioned and I haven't seen one around. Would you mind?"

Grant opened his mouth to inform her a pilot's manual for the atomjet was classified secret, but caught himself before he could verbalize the protest. He shrugged and planned more strategy for invading the general's files.

The only things he could be grateful for so far were Bridget's beauty and the fact the staff had not realized he was her adjutant.

The Mayo psychiatrist and the Yale psychologist had been in conference with Bridget for almost an hour. She had been giving them preliminary findings and the results of tests and interviews with the base pilots.

When they finally broke up, Bridget approached Grant with a there's-something-I-want-from-you look. Grant nearly had a chance to offer lunch before she suggested it.

What she wanted from him came out over their aerated sherbet pie. By the time she finished, Grant's dessert was beginning to taste like vitaminized space rations.

"Impossible," he said, dabbing at sherbet spots on his trousers. "The

general would react faster than to a red alert."

"Your concern may be the general's reactions, but mine's not," Bridget snapped. "I just want an objective engineering answer, yes or no."

Grant threw up his hands. "O.K., O.K. With a live pilot, yes, you can get a TV transmitter in an atomjet with some doing. You'd have to jerk out the extra oxygen space and—"

"Wonderful! When can you have it for me?"

"Bridget, what I'm getting at, the general will take this as a slap at him and his pilots. We've had TV transmission from robotized atomjets dozens of times—"

"With no results."

"With no results," Grant admitted, "but that doesn't mean that with a pilot you'll necessarily get any, either."

"No, but why hasn't someone tried?" Bridget waited for him to answer a decent two seconds and then added, "The general, naturally."

They left the base lunchroom in silence, Bridget pouting a lip-edge more than Grant. Before entering the office, Grant brought up a rebuttal.

"Another thing, no pilot is going to push up under those conditions, with you down there hoping something will happen."

Bridget had her hand on the door, but instead of opening it, paused. "The pilot would have to trust me."

Her eyes darkened, widened, split Grant emotionally down the middle. He could understand for an instant when he let himself how a man could be inveigled to do anything for a woman.

"Yeah," he said. "A pilot like that might be hard to find. I'll see what I can do."

As he walked toward the hangars, he heard the office door close softly behind him.

At the engineering conference after supper Grant had never seen General Morrison looking quite that old. The man was sustaining an overload of responsibility, and probably self-imposed guilt on top of it.

The mechanical engineers made their report, followed by the electronic engineers, followed by the physicist—all negative. But each group had a suspicion that another had overlooked something. Before it regressed to a high-school debate, the general bellowed the conference to order.

Grant was surprised at the twinge of emotion he experienced when he realized the general was not going to ask for a report from syk. Why should Grant care, anyway? The position meant nothing to him, Syk Coördinator.

It meant something to Bridget, though.

That General Morrison had not even checked for syk findings annoyed Grant, perhaps. Under the circumstances he was justified: nothing had yet come out, nothing that Brid-

get had told Grant, anyway. The general could not be aware of this. He assumed it. Maybe that's what upset Grant.

"Then there's this De-Meteor," the general was saying. "I've always been suspicious of that gadget."

An electronics man spoke up. "A Clary man checked them all, even used instrument flight to be certain. I was with him and counter-checked the radar high-speed scanners, the computers, and the course-alteration mechanism. I was convinced myself it would steer the ship out of any situation involving the approach of one or two penetrating meteors."

General Morrison turned to the spatialogist. "What about the incidence of penetrating meteors in the mesosphere?"

"In average fall," the man replied, "fairly low."

"And the probability of encountering three at once along a given atomjet trajectory?"

"From what limited experiments we have made, the odds would be astronomical, I'd say."

The general snorted. "Too great to account for three ships, anyway, is that it?" He soothed his forehead with his big hand. "All right, let's make another check starting tomorrow morning. More robot-flight tests. Let's have ships outside the mesosphere operation range. And I want reports on anything that looks like anything, understand?"

The group emitted a low groan. This was the fourth comprehensive

check—grueling, close, meticulous, nerve-racking work.

From the rear came the voice of a courageous civilian mechanical engineer, "What about a check on the pilots?"

The sudden silence was like an electrical field. The base commander continued to shuffle up his notes and papers, but his neck crimsoned.

He's not going to hear it, Grant thought.

"Conference dismissed!" the general ordered.

Three-four-five rings, and Bridget answered. The first word was a yawned "Lieutenant" and the next was an exhaled "Ashley."

"Sorry to get you up, Bridget. This is Grant. Can you come down to Hangar Four?"

"What time is it?" she asked thickly.

"Three-fifteen. Will you come down here?"

"Unchaperoned?"

"That's not the point. A surprise. What we talked about the other day."

Bridget's interest picked up. "What we talked about? But I'll have to dress and fix my face—"

"Put on a robe and slippers. It's a warm morning. I've got it fixed with the O.D. Now, will you come on down?"

She paused. "You've convinced me."

In a few minutes Grant heard her slippers shuffling over the concrete. She arrived in a brilliant blue nylon

robe, with white fluffy slippers and traces of a lighter blue nightgown underneath. The hangar brightness brought a frown to her eyes, which she shielded with a hand cupped to her brow. A creature as entrancing as that, Grant decided, should now recite prose poetry in contralto tones to make his ideal complete.

"Well?" she croaked, a sleepy frog in her throat. "So I'm here."

The last mechanic was picking up his tools and was about ready to leave. Otherwise, they were alone, except for the guard at the hangar entrance.

"Up on the platform," said Grant, unlocking the canopy of UNR-12. He busied himself adjusting the guiding tension.

He heard the slippers, shuffling and gritting, climb the loading device and stop next to him. He heard the gasp as she saw the pilot compartment's freshly built-in TV transmitter and lens. When he felt the pull on his arm, he chose to notice her.

"Thanks, Grant. I thought for a while—"

"It's ready for tomorrow if you want it," Grant mentioned casually.

Bridget's fists clenched and her eyes brightened. "Wow," she observed. "Then you've got a pilot?"

Grinning sourly, Grant said, "As if you don't know who."

Her eyes showed concern. "What do you mean?"

"I mean things have worked out creamy as you planned."

"Grant, I don't understand."

"Now, don't tell me you didn't know I could push up one of these things." He patted the side of the atomjet.

"You, a pilot? Grant. I didn't know."

"Let's say it's been convenient for you, anyway."

They had walked outside, Bridget trying to find Grant's gaze, which he put onto a distant ridge of hills rising dimly against the desert star-scape.

Bridget said seriously, "You think I've been enticing you into the pilot job, is that it?"

Grant's glance fell to hers. "It looked that way to me. All the general's staff have to fly 'em, I thought you knew that. I don't patrol, of course."

They neared her quarters, and the shadow of the building that spilled over them was deep.

"I didn't know, Grant, believe me." Her voice carried earnestness.

"You don't have to prove it," Grant said huskily.

He had caught her hand, and then her arm slid softly around his neck. Her kiss was meant as brief, but he persuaded her differently. They clung together silently until the barracks guard had spun an about-face and headed back their way.

"Please, Grant, get someone else to go up," she whispered.

"You said you wanted a pilot who trusted you," reminded Grant. "Now, get to bed before I gig you

for being out of uniform. See me tomorrow on TV."

The miles altimeter needle swept steadily and was about to pass the 300 division. Star-sprinkled space-darkness lay ahead by now, but when he looked to the side the Earth's surface reflected the sunlight dazzlingly.

It wasn't that he felt self-consciousness over the lens in front of him, or over the one showing him in profile, and the one just over his shoulder viewing the instrument panel. Nor was it based on his not pushing up in over a month. He traced it probably to the uncertainty of his position.

His position was uncertain, because Bridget could easily be right. Actually, considering the lack of one lead in the other avenues of the investigation, chances were good something was happening to pilots and could happen to him.

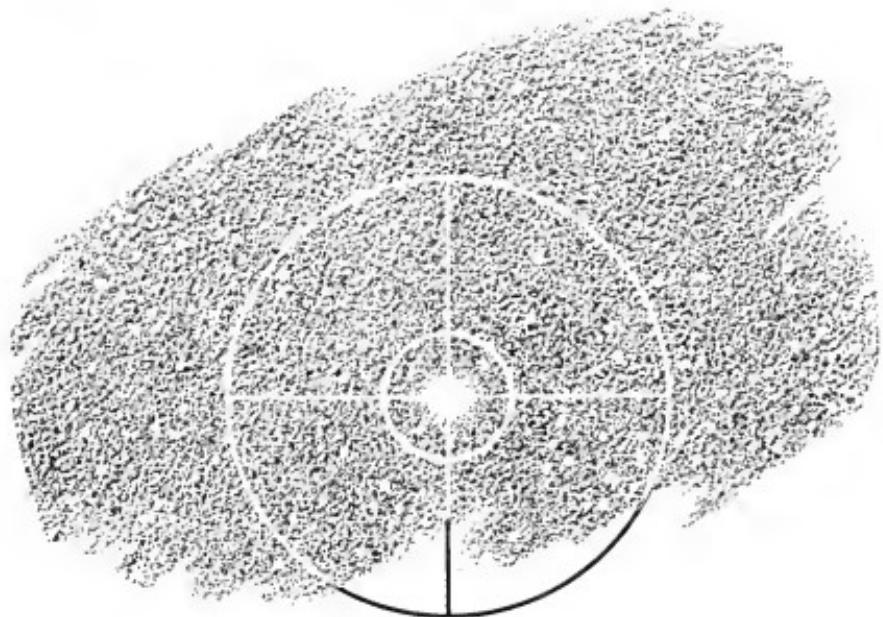
That was not what bothered him: not that something might occur, but *what* might occur. Fighting unknowns for Grant carried no interest.

"I'm over 300," he transmitted. "Now what?"

Bridget's voice arrived with an ionospheric waver. "Level at 375. Please remember, you're trying to simulate patrol conditions. Don't transmit unless it's your report period or something goes wrong."

"Like what, lieutenant?"

"If you knew all the psychological quirks possible, you'd avoid them, major. And if you're still worried,



I've taken adequate precautions. There's a staff of twenty-five persons here with instruments on you. By the way, your picture is coming over horribly."

"Try my profile. I've heard it's better."

"And please replace your galvanometric and respiratory clamps. We're getting no register here."

"They're too uncomfortable."

"Major, let me remind you this flight is costing the taxpayers plenty, hasn't General Morrison's clearance, and may have to be flown again unless you coöperate fully." Grant smiled at the lens. He could visualize her curls whipping around.

"Now, please coöperate and replace the clamps, and try to simulate patrol conditions. I will call you from

time to time for further instructions. Ashley at Mojave—out."

Grant returned, "Reis over Mojave—nuts."

After parodying annoyance at the lens, he dutifully replaced the chest and palm clamps and settled down to the tedium of patrol.

Behind him, tons of pressure thundered silently out in controlled gaseous fusion, hurled him starward on a pillar of energy. He had already broken his vertical ascent and was slanting toward the latitude Bridget requested. The Pacific rolled up under the atomjet's polished nose, which sparkled with myriads of brighter star reflections. Then he recalled he couldn't play over the ocean and veered slowly northward,

up the coast to the telltale configuration of Puget Sound.

Over the eastern lakes he cut fusion and watched on the altimeter dial the battle between gravity and inertia. Near the Mississippi delta he was wrenched in a sharp maneuver as the De-Meteor suddenly took over. He was fortunate to see the streaking missile glow brightly and flare out of existence in the thin regions of atmosphere miles beneath him.

More than three hours of patrol, and no word from Mojave. Obediently, Grant had not called in. He set course for Mojave and was nearly ready to transmit when a bark of static filled the pressurized control bubble. Disappointed, Grant heard a male voice over the speaker.

"High altitude weather observation overdue. UNR-12, please report synoptics in quadrants."

They really want simulation, Grant grumbled mentally. "Southwest quadrant, southeast quadrant clear except for banner-clouding higher ranges. Northwest, scattered altocumulus, looks like the onset of a warm front, with the northeast quadrant moderate-high cirrus. And let me talk to Br . . . to Lieutenant Ashley, please."

A pause. "Ashley, Mojave."

"How's my picture now?"

"Your vertical is off, and you flutter. Major, the first three hours have been without direction from the base. For the next two, we're going to ask you to perform certain patrol tasks, perhaps repeat them. The

process may not prove especially enjoyable. Your close coöperation will be appreciated."

"If this is all stuff we went through in training—" Grant sputtered.

"Some of it may be," Bridget's voice. "The fact it's distasteful may make it the more significant. Are you ready to coöperate?"

Grant nodded at the lens and screwed up his face in an exaggerated frown.

Bridget's thoroughness called for admiration. She had him at the end of a string, activating him from a plot taken directly from the pilot's manual. He would coöperate, but he was not enthusiastic.

As the exercises progressed, Grant detected subtle variations Bridget had added to the basic maneuvers. On the tight starboard circle, for instance, she had him keep his eyes on Earth, making him slightly dizzy.

Then she requested a free-fall drop from a stall with the provision he this time place his attention on the instrument panel—"with no peeking outside." He complied, watching the altimeter trace forty miles toward the basement, and experienced effects no different than usual.

After a while, he came to consider it a game and might have gained amusement from it, were it not for the tiredness creeping in behind his eyes and the fact two dozen technicians somewhere down there were hoping to trip a fatal, hidden synapse.

"How much more of this?" Grant transmitted finally.

"Getting tired?" Bridget replied, and paused for an answer.

"Let's say I don't feel like six sets of tennis."

"A few more, major, and we'll authorize your glide-in." If there was disappointment in her voice, it did not manifest itself. "Your next exercise is manual navigation with Jupiter as your fix."

Grant took down the figures she gave in acute disinterest. Boredom had settled heavily over his outlook on the operation. No longer did it matter that his facial reactions were being televised to the syk-happy probbers; and it made no difference to him any more that his every breath, swallow, heart beat, tension, and sweat-secretion was magnified by inky needles along moving rolls of paper.

His exercise target was a southwestern New Mexico town, and he swung back from the Gulf area and coaxed the responsive craft until the planet gleamed brightly in the cross-hairs of the navigational sight. That put him four degrees off the horizontal, he noted, but Jupiter was setting; he adjusted his velocity to maintain the planet's relative skyward position in the west.

In some irritation he stepped up the thrust. This one could easily take too long. The faint hum of the power plant provided music as the bright point of light danced slightly from the sight's center.

The realization came that he had jumped convulsively. Grant was puzzled that he was not aware what had happened. Some sort of reflex? But reflex from what? Tingling coursed its way up his left leg and he rubbed his thigh.

When he put his attention on the sight again, the planet had slipped out. In fact, it was nowhere in the immediate starscape ahead of him.

His quick glance at the basement showed first that a twilight shadow was moving in from the north—From the north? It had to be the east! And how come so soon?

Small panic twisted his diaphragm when he viewed below unfamiliar topography and increasing cloudiness. And when he saw by his watch it was nearly three—

The radio had started to transmit. He swallowed a lump of fear and prepared some kind of an answer. ". . . If you hear me. Please indicate if you hear me, Grant."

He nodded at the lens.

"Would you like a pilot to help you orient from here?"

Grant felt sheepish, but the panic still remained. He was now aware his alertness was not up to par, so he nodded again. But he was feeling better by the minute.

Back on course under one of the pilot's directions, Grant soon took over.

"Skip that exercise, Grant, and glide in," Bridget sent. "Feel up to it, now?"

"Yeah, but what's it all about?"

I must've passed out, but damned if I know what for."

Grant heard Bridget's laugh and his morale improved. "You come down and take me to dinner and I'll give you the answer—and what I think may be the answer to all the general's troubles. Right now I've got a report to write so the general can get the word soon—and as painlessly as possible."

Grant pressed the stud to activate the skin coolant system for entrance into the atmosphere. He almost felt like grinning.

Grant at the medical officer's advice took a brief nap, which quickly cleared up his mental fuzziness. As a surprise to Bridget he ordered a rotocab from Barstow, the nearest town, booming since the base had become operative.

In a specialty restaurant over freshly arrived seafood from San Francisco, Grant tried to persuade Bridget to stop teasing him about the navigational foul-up and set him straight. He had put up with it as long as he did only because she had worn an off-shoulder yellow gown, snugly fitted, that made the uniform seem like the design of a Mid-Victorian prude.

Grant, exasperated, brought her teasing up short. "I've been priding myself on keeping up the myth I'm a wide-awake young man and pilot. Never have I passed out before—never. I feel like a washed-out cadet. You've had your fun baiting—now, what made me blank?"

Bridget cringed as he tore a slice of French bread in half with one hostile, meaningful bite.

She waved her cigarette haughtily. "We in psychology have found certain stimuli productive of consistent human response. Especially true in tactile sensation, this, however, is not as true in the auditory and visual."

"You're being technical," Grant interrupted. "Just let me know simple-like, if you don't mind."

"Consequently," she continued, "the problem presented to the investigating psychologist was one of seeking an involuntary response to one or more stimuli, in sequence or grouped. Traditionally—"

"Miss Ashley—" Grant held up the small, square tissue-wrapped box, tied with a bow—"I would like to have you open this tonight, but obviously you're not going to have time what with the thesis, and all." He deliberately put the box back in his coat pocket.

Their eyes held over her swordfish momentarily.

"So, O.K., I looked around for nasty stimuli, that's all," Bridget went on. "There were lots of possibilities, but I sorta picked two or three. Part of our pilot interviews was for getting descriptions from the men on what the conditions up there felt like, sounded like, looked like, smelled like, and so on. Completely individual, mind you. From that we spottted negative elements held in common by them."

Grant reached for her arm and

blocked the upward motion of her fish-loaded fork.

"You can eat after," he said.

"I threw the nasty ones at you when you began tiring, because that's when the body's stimulus-response setup starts pulling away from conscious direction. I saved the one I had the hunch on for the last."

"The navigation exercise, you mean? I still don't get what that has to do with my leg cramp."

Bridget laughed. "Oh, that. One of those leads attached to your leg carried a little voltage—just in case you passed out. The benefits of current psychology, you know."

Grant repressed a smile. "Thanks for letting me know what brought me around, but you are still stalling about why I went under."

"You figure it out. What were the stimuli associated with the manual navigation problem?"

"Let's see," he mused. "Tactile: nothing important, just the control levers. Visually, the star field and Jupiter and the crosshairs. Auditorily, the power hum—"

"What stands out?"

"The planet and the hum, I guess."

"And how did the planet appear?" Bridget asked.

"A point of light, you mean?"

"And what does that add up to: a bright concentrated light source on which you fix your attention and a monotonous hum?"

"Not hypnotism!"

Bridget shrugged. "A reasonable

facsimile. Especially when you throw mental fatigue in with it."

"But you need a suggestion, I thought—" Grant was amazed.

"Not necessarily," she replied. "You were mentally tired, there was some self-suggestion for sleep. But simply a continued fixation of the eyes in suggestive subjects can be enough. There may be a subconscious association with previous hypnosis, or early states of mental shock. In the highly suggestive, a steady lulling noise can be sufficient in itself. And you were alone, with no one around to snap a finger under your nose. Add it up in your situation, and you blank out."

Grant slapped his forehead. "What did I look like?"

"Not any different than usual," she said, laughing. "You continued to hold the controls, but you stared vacantly and tensed quite a bit. Well, we have the complete recording on your reactions if you want to check. Naturally, you pulled off course, ended up over Mexico, gaining about fifty miles in altitude."

The others, thought Grant, rode until their oxygen gave out or dived through the atmosphere without skin-cooling, or came out of it too late and found— He decided not to think about it.

"But I don't think I'm hypnotic," Grant protested.

"Everyone is hypnotic to a degree. Some are a great deal more than others, and these are the ones that are apparent. Impose the right conditions and a quasi-hypnotic condi-

tion could be affected on most anyone."

"But why hasn't this happened elsewhere?"

Bridget took a quick bite of fish before he could stop her. "It has. First documentation I found was in the South Pacific air war in the '40s. One-man escorting fighter planes in several cases slipped out of bomber formations they were following at night and splashed. One of the explanations at their hearings, but never investigated thoroughly, was hypnosis from the single red taillight of the bombers. In one outfit, the losses stopped when the fighters flew up front."

"Not only sharp, but good-looking, too," Grant admired, and began chewing on the other half of his French bread. Then he ceased masticating and mouthed anxiously, "You've told the general this?"

Bridget clapped her hands. "With exquisite pleasure."

"And he—?"

". . . Got excited, phoned for engineering to remove navigational sights and suggested I join the staff at the base."

Grant coughed on the bread and hurriedly reached for his water. "He wants you around?"

"Gratitude, I guess, in his own brassy way."

"And you'll stay?"

"If Washington O.K.'s it, and I'm coaxed."

"Then that simplifies the matter," he said and brought out the daintily wrapped tiny gift box. "For you."

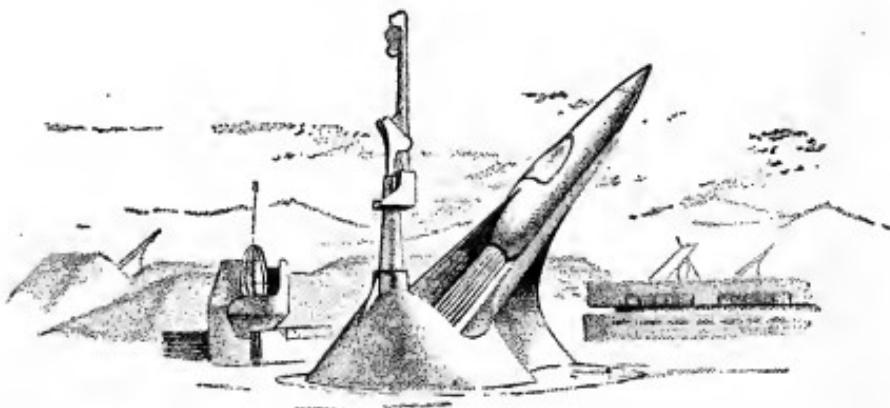
Her eyes warmed and smiled as she said, "That's the kind of coaxing a woman wants."

Grant fumed, "Then you know what it is? Extrasensory perception or something psychological?"

Their hands met across the table and lingered.

"Purely an emotional response," said Bridget.

THE END





DIABOLOGIC

BY ERIC FRANK RUSSELL

One way to keep a man from getting anywhere is to give him a toy—a nonsense puzzle—that he can't put down. It's much more effective than trying to forcibly hold him!

Illustrated by Freas

DIABOLOGIC

He made one circumnavigation to put the matter beyond doubt. That was standard space-scout technique; look once on the approach, look again all the way round. It often happened that second and closer impressions contradicted first and more distant ones. Some perverse factor in the probability sequence frequently caused the laugh to display itself on the other side of a planetary face.

Not this time, though. What he'd observed coming in remained visible right around the belly. This world was occupied by intelligent life of a

high order. The unmistakable markings were there in the form of dock-yards, railroad marshaling grids, power stations, spaceports, quarries, factories, mines, housing projects, bridges, canals, a hundred and one other signs of life that spawns fast and vigorously.

The spaceports in particular were highly significant. He counted three of them. None held a flightworthy ship at the moment he flamed high above them, but in one was a tubeless vessel undergoing repair. A long, black, snouty thing about the size and shape of an Earth-Mars tramp. Certainly not as big and racy-looking as a Sol-Sirius liner.

As he gazed down through his tiny control-cabin's armorglass he knew that this was to be contact with a vengeance. During long, long centuries of human expansion more than seven hundred habitable worlds had been found, charted, explored and in some cases exploited. All contained life. A minority held intelligent life. But up to this moment nobody had found one other life form sufficiently advanced to cavort among the stars.

Of course, such a discovery had been theorized. Human adventuring created an exploratory sphere that swelled into the cosmos. Sooner or later, it was assumed, that sphere must touch another one at some point within the heavenly host. What would happen then was anybody's guess. Perhaps they'd fuse, making a bigger, shinier biform bubble. Or perhaps both bubbles would burst.

Anyway, by the looks of it the touching-time was now.

If he'd been within reach of a frontier listening-post, he'd have beamed a signal detailing this find. Even now it wasn't too late to drive back for seventeen weeks and get within receptive range. But that would mean seeking a refueling dump while he was at it. The ship just hadn't enough for such a double run plus the return trip home. Down there they had fuel. Maybe they'd give him some and maybe it would suit his engines. And just as possibly it would prove useless.

Right now he had adequate power reserves to land here and eventually get back to base. A bird in the hand is worth two in the bush. So he tilted the vessel and plunged into the alien atmosphere, heading for the largest spaceport of the three.

What might be awaiting him at ground-level did not bother him at all. The Terrans of today were not the nervy, apprehensive Terrans of the Earthbound and lurid past. They had become space-sophisticated. They had learned to lounge around with a carefree smile and let the other life forms do the worrying. It lent an air of authority and always worked. Nothing is more intimidating than an idiotic grin worn by a manifest non-idiot.

Quite a useful weapon in the diabolical armory was the knowing smirk.

His landing created a most satisfactory sensation. The planet's point-

nine Earth-mass permitted a little extra dexterity in handling the ship. He swooped it down, curved it up, dropped tail-first, stood straddle-legged on the tail-fins, cut the braking blast and would not have missed centering on a spread handkerchief by more than ten inches.

They seemed to spring out of the ground the way people do when cars collide on a deserted road. Dozens of them, hundreds. They were on the short side, the tallest not exceeding five feet. Otherwise they differed from his own pink-faced, blue-eyed type no more than would a Chinese covered in fine gray fur.

Massing in a circle beyond range of his jet-rebound, they stared at the ship, gabbled, gesticulated, nudged each other, argued, shrugged shoulders and generally behaved in the manner of a curious mob that has discovered a deep, dark hole with strange noises issuing therefrom. The noteworthy feature about their behavior was that none were scared, none attempted to get out of reach either openly or surreptitiously. The only thing about which they were wary was the chance of a sudden blast from the silent jets.

He did not emerge at once. That would have been an error—and blunderers are not chosen to pilot scout-vessels. Pre-exit rule number one is that air must be tested. What suited that crowd outside would not necessarily agree with him. Anyway, he'd have checked air even if his own mother had been smoking a cigar in the front rank of the audience.

The Schrieber analyzer required four minutes in which to suck a sample through the Pitot tube, take it apart, sneer at the bits, make a bacteria-count and say whether its lord and master could condescend to breathe the stuff.

While it made up its mind, he sat in patience. Finally the needle on its half-red, half-white dial crawled reluctantly to mid-white. A fast shift would have pronounced the atmosphere socially acceptable. Slowness was the Schrieber's way of saying that his lungs were about to go slumming. The analyzer was and always had been a robotic snob that graded alien atmospheres on the caste system. The best and cleanest air was Brahmin, pure Brahmin. The worst was Untouchable.

Switching it off, he opened the inner and outer air lock doors, sat in the rim with his feet dangling eighty yards above ground-level. From this vantage point he calmly surveyed the mob, his expression that of one who can spit but not be spat upon. The sixth diabolical law states that the higher, the fewer. Proof: the seagull's tactical advantage over man.

Being intelligent, those placed by unfortunate circumstances eighty yards deeper in the gravitational field soon appreciated their state of vertical disadvantage. Short of toppling the ship or climbing a polished surface they were impotent to get at him. Not that they wanted to in any inimical way. But desires grow strongest when least possible of satisfaction. So they wanted him down there, face

to face, merely because he was out of reach.

To make matters worse, he turned sidewise and lay within the rim, one leg hitched up and hands linked around the knee, then continued looking at them in obvious comfort. They had to stand. And they had to stare upward at the cost of a crick in the neck. Alternatively they could adjust their heads and eyes to a crickless level and endure being looked at while not looking. Altogether, it was a hell of a situation.

The longer it lasted the less pleasing it became. Some of them shouted at him in squeaky voices. Upon those he bestowed a benign smile. Others gesticulated. He gestured back and the sharpest among them weren't happy about it. For some strange reason no scientist had bothered to investigate certain digital motions stimulate especial glands in any part of the cosmos. Basic diabolical training included a course in what was known as signal-deflation whereby the yolk could be removed from an alien ego with one wave of the hand.

For a while the crowd surged restlessly around nibbling the gray fur on the backs of their fingers, muttering to each other and occasionally throwing sour looks upward. They still kept clear of the danger zone, apparently assuming that the specimen reclining in the lock-rim might have a companion at the controls. Next, they became moody, content to do no more than scowl futilely at the tail-fins.

That state of affairs lasted until a convoy of heavy vehicles arrived and unloaded troops. The newcomers bore riot-sticks, hand-guns, and wore uniforms the color of stuff hogs roll in. Forming themselves into three ranks, they turned right at a barked command, marched forward. The crowd opened to make way.

Expertly they stationed themselves in an armed circle separating the ship from the horde of onlookers. A trio of officers paraded around and examined the tail-fins without going nearer than was necessary. Then they backed off, stared up at the air lock rim. The subject of their attention gazed back with academic interest.

The senior of the three officers patted his midriff where his heart was located, bent and patted the ground, forced pacific innocence into his face as again he stared at the arrival high above. The tilt of his head made the officer's hat fall off and in turning to pick it up he trod on it.

This petty incident seemed to gratify the one eighty yards higher because he chuckled, let go the leg he was nursing, leaned out for a better look at the victim. Red-faced under his fur complexion, the officer once more performed the belly and ground massage. The other understood this time. He gave a nod of gracious assent, disappeared into the lock. A few seconds later a nylon ladder snaked down the ship's side and the invader descended with monkeylike agility.

Three things struck the troops and ASTOUNDING SCIENCE FICTION

the audience immediately he stood before them, namely, the nakedness of his face and hands, his greater size and weight and the fact that he carried no visible weapons. Strangeness of shape and form was to be expected. After all, they had done some space-roaming themselves and knew of life forms more outlandish. But what sort of creature has the brains to build a ship and not the sense to carry means of defense?

They were essentially a logical people.

The poor saps.

The officers made no attempt to converse with this specimen from the great unknown. They were not telepathic and space experience had taught them that mere mouth-noises are useless until one side or the other has learned the meanings thereof. So by signs they conveyed to him their wish to take him to town where he would meet others of their kind more competent to establish contact. They were pretty good at explaining with their hands, as was natural for the only other life form that had found new worlds.

He agreed to this with the same air of a lord consorting with the lower orders that had been apparent from the start. Perhaps he had been unduly influenced by the Schrieber. Again the crowd made way while the guard conducted him to the trucks. He passed through under a thousand eyes, favored them with deflatory gesture number seventeen, this being a nod that acknowledged their existence

and tolerated their vulgar interest in him.

The trucks trundled away leaving the ship with air lock open, ladder dangling and the rest of the troops still standing guard around the fins. Nobody failed to notice that touch, either. He hadn't bothered to prevent access to the vessel. There was nothing to prevent experts looking through it and stealing ideas from another space-going race.

Nobody of that caliber could be so criminally careless. Therefore it could not be carelessness. Pure logic said the ship's designs were not worth protecting from the stranger's viewpoint because they were long out of date. Or else they were unstealable because beyond the comprehension of a lesser people. Who the heck did he think they were? By the Black World of Khas, they'd show him!

A junior officer climbed the ladder, explored the ship's interior, came down, reported no more aliens within, not even a pet *lansim*, not a pretzel. The stranger had come alone. This item of information circulated through the crowd. They did not care for it overmuch. A visit by a fleet of battleships bearing ten thousand they could understand. It would be a show of force worthy of their stature. But the casual arrival of one and only one smacked somewhat of the dumping of a missionary among the heathens of the twin worlds of Morantia.

Meanwhile the trucks rolled clear of the spaceport, speeded up through twenty miles of country, encircled a

city. Here the leading vehicle parted company from the rest, made for the western suburbs, arrived at a fortress surrounded by huge walls. The stranger dismounted and promptly got tossed into jail.

The result of that was odd, too. He should have resented incarceration seeing that nobody had yet explained the purpose of it. But he didn't. Treating the well-clothed bed in his cell as if it were a luxury provided as recognition of his rights, he sprawled on it full length, boots and all, gave a sigh of deep satisfaction and went to sleep. His watch hung close by his ear and compensated for the constant ticking of the autopilot without which slumber in space was never complete.

During the next few hours guards came frequently to look at him and make sure that he wasn't breaking the locks or disintegrating the bars by means of some alien technique. They had not searched him and accordingly were cautious. But he snored on, dead to the world, oblivious to the ripples of alarm spreading through a spatial empire.

He was still asleep when Parmith arrived bearing a load of picture-books. Parmith, elderly and myopic, sat by the bedside and waited until his own eyes became heavy in sympathy and he found himself considering the comfort of the carpet. At that point he decided he must either get to work or lie flat. He prodded the other into wakefulness.

They started on the books. Ah is

for ahmud that plays in the grass. Ay is for aysid that's kept under glass. Oom is for oom-tuk that's found in the moon. Uhm is for uhmlak, a clown or buffoon. And so on.

Stopping only for meals they were at it the full day and progress was fast. Parmith was a first-class tutor, the other an excellent pupil able to pick up with remarkable speed and forget nothing. At the end of the first long session they were able to indulge in a brief and simple conversation.

"I am called Parmith. What are you called?"

"Wayne Hillder."

"Two callings?"

"Yes."

"What are many of you called?"

"Terrans."

"We are called Vards."

Talk ceased for lack of enough words and Parmith left. Within nine hours he was back accompanied by Gerka, a younger specimen who specialized in reciting words and phrases again and again until the listener could echo them to perfection. They carried on another four days, working into late evening.

"You are not a prisoner."

"I know," said Wayne Hillder, blandly self-assured.

Parmith looked uncertain. "How do you know?"

"You would not dare to make me one."

"Why not?"

"You do not know enough. Therefore, you seek common speech. You must learn from me—and quickly."

This being too obvious to contradict, Parmith let it go by and said, "I estimated it would take about ninety days to make you fluent. It looks as if twenty will be sufficient."

"I wouldn't be here if my kind weren't smart," Hillder pointed out.

Gerka registered uneasiness, Parmith was disconcerted.

"No Vard is being taught by us," he added for good measure. "Not having got to us yet."

Parmith said hurriedly, "We must get on with this task. An important commission is waiting to interview you as soon as you can converse with ease and clarity. We'll try again this fth-prefix that you haven't got quite right. Here's a tongue-twister to practice on. Listen to Gerka."

"*Ftbon deas ftbleman ftbangafth*," recited Gerka, pinching his bottom lip.

"*Futbong deas*—"

"*Fthon*," corrected Gerka. "*Ftbon deas ftbleman ftbangafth*."

"It's better in a civilized tongue. Wet evenings are gnatless. *Futbong*—"

"*Fthon*!" insisted Gerka, playing catapults with his mouth.

The commission sat in an ornate hall containing semicircular rows of seats rising in ten tiers. There were four hundred present. The way in which attendants and minor officials fawned around them showed that this was an assembly of great importance.

It was, too. The four hundred represented the political and military power of a world that had created a

space-empire extending through a score of solar systems and controlling twice as many planets. Up to a short time ago they had been to the best of their knowledge and belief the lords of creation. Now there was some doubt about it. They had a serious problem to settle, one that a later Terran historian irreverently described as "a moot point."

They ceased talking among themselves when a pair of guards arrived in charge of Hillder, led him to a seat facing the tiers. Four hundred pairs of eyes examined the stranger, some curiously, some doubtfully, some challengingly, many with unconcealed antagonism.

Sitting down, Hillder looked them over much as one looks into one of the more odorous cages at the zoo. That is to say, with faint distaste. Gently he rubbed the side of his nose with a forefinger and sniffed. Deflatory gesture twenty-two, suitable for use in the presence of massed authority. It brought its carefully calculated reward. Half a dozen of the most bellicose characters glared at him.

A fury-faced oldster stood up frowning, spoke to Hillder as if reciting a well-rehearsed speech. "None but a highly intelligent and completely logical species can conquer space. It being self-evident that you are of such a kind, you will appreciate our positon. Your very presence compels us to consider the ultimate alternatives of coöperation or competition, peace or war."

"There are no two alternatives to

anything," Hillder asserted. "There is black and white and a thousand intermediate shades. There is yes and no and a thousand ifs, buts or maybes. For example: you could move farther out of reach."

Being tidy-minded, they didn't enjoy watching the thread of their logic being tangled. Neither did they like the resultant knot in the shape of the final suggestion. The oldster's frown grew deeper, his voice sharper.

"You should also appreciate your own position. You are one among countless millions. Regardless of whatever may be the strength of your kind you, personally, are helpless. Therefore, it is for us to question and for you to answer. If our respective positions were reversed, the contrary would be true. That is logical. Are you ready to answer our questions?"

"I am ready."

Some showed surprise at that. Others looked resigned, taking it for granted that he would give all the information he saw fit and suppress the rest.

Resuming his seat, the oldster signed to the Vard on his left who stood up and asked, "Where is your base world?"

"At the moment I don't know."

"You don't know?" His expression showed that he had expected awkwardness from the start. "How can you return to it if you don't know where it is?"

"When within its radio-sweep I pick up its beacon. I follow that."

"Aren't your space charts sufficient to enable you to find it?"

"No."

"Why not?"

"Because," said Hillder, "it isn't tied to a primary. It wanders around."

Registering incredulity, the other said, "Do you mean that it is a planet broken loose from a solar system?"

"Not at all. It's a scout base. Surely you know what that is?"

"I do not," snapped the interrogator. "What is it?"

"A tiny, compact world equipped with all the necessary contraptions. An artificial sphere that functions as a frontier outpost."

There was a deal of fidgeting and murmuring among the audience as individuals tried to weigh the implications of this news.

Hiding his thoughts, the questioner continued, "You define it as a frontier outpost. That does not tell us where your home world is located."

"You did not ask about my home world. You asked about my base world. I heard you with my own two ears."

"Then where is your home world?"

"I cannot show you without a chart. Do you have charts of unknown regions?"

"Yes." The other smiled like a satisfied cat. With a dramatic flourish he produced them. "We obtained them from your ship."

"That was thoughtful of you," said Hillder, disappointingly pleased.

Leaving his seat he placed a finger-tip on the topmost chart and said, "There! Good old Earth!" Then he returned and sat down.

The Vard stared at the designated point, glanced around at his fellows as if about to make a remark, changed his mind and said nothing. Producing a pen he marked the chart, rolled it up with the others.

"This world you call Earth is the origin and center of your empire?"

"Yes."

"The mother-planet of your species?"

"Yes."

"Now," he went on, firmly, "how many of your kind are there?"

"Nobody knows."

"Don't you check your own numbers?"

"We did once upon a time. These days we're too scattered around." Hillder pondered a moment, added helpfully, "I can tell you that there are four billions of us spread over three planets in our own solar system. Outside of those the number is a guess. We can be divided into the rooted and the rootless and the latter can't be counted. They won't let themselves be counted because somebody might want to tax them. Take the grand total as four billions plus."

"That tells us nothing," the other objected. "We don't know the size of the plus."

"Neither do we," said Hillder, visibly awed at the thought of it. "Sometimes it frightens us." He surveyed the audience. "If nobody's ever

been scared by a plus, now's the time."

Scowling, the questioner tried to get at it another way. "You say you are scattered. Over how many worlds?"

"Seven hundred fourteen at last report. That's already out of date. Every report is eight to ten planets behind the times."

"And you have mastery of that huge number?"

"Whoever mastered a planet? Why, we haven't yet dug into the heart of our own and I doubt that we ever shall." He shrugged, finished, "No, we just amble around and maul them a bit. Same as you do."

"You mean you exploit them?"

"Put it that way if it makes you happy."

"Have you encountered no opposition at any time?"

"Feeble, friend, feeble," said Hillder,

"What did you do about it?"

"That depended upon circumstances. Some folk we ignored, some we smacked, some we led toward the light."

"What light?" asked the other baffled.

"That of seeing things our way."

It was too much for a paunchy specimen in the third row. Coming to his feet he spoke in acidulated tones. "Do you expect us to see things your way?"

"Not immediately," Hillder said.

"Perhaps you consider us incapable of—"

The oldster who had first spoken now arose and interjected, "We must proceed with this inquisition logically or not at all. That means one line of questioning at a time and one questioner at a time." He gestured authoritatively toward the Vard with the charts. "Carry on, Thormin."

Thormin carried on for two solid hours. Apparently he was an astronomical expert for all his questions bore more or less on that subject. He wanted details of distances, velocities, solar classifications, planetary conditions and a host of similar items. Willingly Hillder answered all that he could, pleaded ignorance with regard to the rest.

Eventually Thormin sat down and concentrated on his notes in the manner of one absorbed in fundamental truth. He was succeeded by a hard-eyed individual named Grasud who for the last half-hour had been fidgeting with impatience.

"Is your vessel the most recent example of its type?"

"No."

"There are better models?"

"Yes," agreed Hillder.

"Very much better?"

"I wouldn't know, not having been assigned one yet."

"Strange, is it not," said Grasud pointedly, "that an old-type ship should discover us while superior ones have failed to do so?"

"Not at all. It was sheer luck. I happened to head this way. Other scouts, in old or new ships, boosted other ways. How many directions are

there in deep space? How many radii can be extended from a sphere?"

"Not being a mathematician, I—"

"If you were a mathematician," Hillder interrupted, "you would know that the number works out at 2^n ." He glanced over the audience, added in tutorial manner, "The factor of two being determined by the demonstrable fact that a radius is half a diameter and 2^n being defined as the smallest number that makes one boggle."

Grasud boggled as he tried to conceive it, gave it up, said, "Therefore, the total number of your exploring vessels is of equal magnitude?"

"No. We don't have to probe in every direction. It is necessary only to make for visible stars."

"Well, aren't there stars in every direction?"

"If distance is disregarded, yes. But one does not disregard distance. One makes for the nearest yet-unexplored solar systems and thus cuts down repeated jaunts to a reasonable number."

"You are evading the issue," said Grasud. "How many ships of your type are in actual operation?"

"Twenty."

"Twenty?" He made it sound an anticlimax. "Is that all?"

"It's enough, isn't it? How long do you expect us to keep antiquated models in service?"

"I am not asking about out-of-date vessels. How many scout ships of all types are functioning?"

"Really I don't know. I doubt

whether anyone knows. In addition to Earth's fleets some of the most advanced colonies are running expeditions of their own. What's more, a couple of allied life forms have learned things from us, caught the fever and started poking around. We can no more take a complete census of ships than we can of people."

Accepting that without argument, Grasud went on, "Your vessel is not large by our standards. Doubtless you have others of greater mass." He leaned forward, gazed fixedly. "What is the comparative size of your biggest ship?"

"The largest I've seen was the battleship *Lance*. Forty times the mass of my boat."

"How many people does it carry?" Grasud asked.

"It has a crew numbering more

than six hundred but at a pinch it can transport three times that."

"So you know of at least one ship with an emergency capacity of about two thousand?"

"Yes."

More murmurings and fidgetings among the audience. Disregarding them, Grasud carried on with the air of one determined to learn the worst.

"You have other battleships of equal size?"

"Yes."

"How many?"

"I don't know. If I did, I'd tell you. Sorry."

"You may have some even bigger?"

"That is quite possible," Hillder conceded. "If so, I haven't seen one



yet. But that means nothing. One can go through a lifetime and not see everything. If you calculate the number of seeable things in existence, deduct the number already viewed, the remainder represents the number yet to be seen. And if you study them at the rate of one per second it would require—"

"I am not interested," snapped Grasud, refusing to be boggled by alien argument.

"You should be," said Hillder. "Because infinity minus umpteen millions leaves infinity. Which means that you can take the part from the whole and leave the whole still intact. You can eat your cake and have it. Can't you?"

Grasud flopped into his seat, spoke moodily to the oldster. "I seek information, not a blatant denial of logic. His talk confuses me. Let Shahding have him."

Coming up warily, Shahding started on the subject of weapons, their design, mode of operation, range and effectiveness. He stuck with determination to this single line of inquiry and avoided all temptations to be sidetracked. His questions were astute and penetrating. Hillder answered all he could, freely, without hesitation.

"So," commented Shahding, toward the finish, "it seems that you put your trust in force-fields, certain rays that paralyze the nervous system, bacteriological techniques, demonstrations of number and strength, and a good deal of persuasiveness.

Your science of ballistics cannot be advanced after so much neglect."

"It could never advance," said Hillder. "That's why we abandoned it. We dropped fiddling around with bows and arrows for the same reason. No initial thrust can outpace a continuous and prolonged one. Thus far and no farther shalt thou go." Then he added by way of speculative afterthought, "Anyway, it can be shown that no bullet can overtake a running man."

"Nonsense!" exclaimed Shahding, having once ducked a couple of slugs himself.

"By the time the bullet has reached the man's point of departure the man has retreated," said Hillder. "The bullet then has to cover that extra distance but finds the man has retreated farther. It covers that too, only to find that again the man is not there. And so on and so on."

"The lead is reduced each successive time until it ceases to exist," Shahding scoffed.

"Each successive advance occupies a finite length of time no matter how small," Hillder pointed out. "You cannot divide and subdivide a fraction to produce zero. The series is infinite. An infinite series of finite time-periods totals an infinite time. Work it out for yourself. The bullet does not hit the man because it cannot get to him."

The reaction showed that the audience had never encountered this argument before or concocted anything like it of their own accord.

None were stupid enough to accept it as serious assertion of fact. All were sufficiently intelligent to recognize it as logical or pseudo-logical denial of something self-evident and demonstrably true.

Forthwith they started hunting for the flaw in this alien reasoning, discussing it between themselves so noisily that perforce Shahding stood in silence waiting for a break. He posed like a dummy for ten minutes while the row rose crescendo. A group in the front semicircle left their seats, kneeled and commenced drawing diagrams on the floor while arguing vociferously and with some heat. At that moment a couple of Vards in the back tier showed signs of coming to blows.

Finally the oldster, Shahding and two others bellowed a united, "Quiet!"

The investigatory commission settled down with reluctance, still muttering, gesturing, showing each other sketches on pieces of paper. Shahding fixed ireful attention on Hillder, opened his mouth in readiness to resume.

Beating him to it, Hillder said casually, "It sounds silly, doesn't it? But anything is possible, anything at all. A man can marry his widow's sister."

"Impossible," declared Shahding, able to dispose of that without abstruse calculations. "He must be dead for her to have the status of a widow."

"A man married a woman who died. He then married her sister. He

died. Wasn't his first wife his widow's sister?"

Shahding shouted, "I am not here to be tricked by the tortuous squirmings of an alien mind." He sat down hard, fumed a bit, said to his neighbor, "All right, Kadina, you can have him and welcome."

Confident and self-assured, Kadina stood up, gazed authoritatively around. He was tall for a Vard, wore well-cut uniform with crimson epaulettes and crimson-banded sleeves. For the first time in a while there was silence. Satisfied with the effect he had produced, he faced Hillder, spoke in tones deeper, less squeaky than any heard so far.

"Apart from the petty problems with which it has amused you to baffle my compatriots," he began in oily manner, "you have given candid, unhesitating answers to our questions. You have provided much information that is useful from the military viewpoint."

"I am glad you appreciate it," said Hillder.

"We do. Very much so." Kadina bestowed a craggy smile that looked sinister. "However, there is one matter that needs clarifying."

"What is that?"

"If the present situation were reversed, if a lone Vard-scout was subject to intensive cross-examination by an assembly of your life form, and if he surrendered information as willingly as you have done—" He let it die out while his eyes hardened, then growled, "We would consider him a

traitor to his kind. The penalty would be death."

"How fortunate I am not to be a Vard," said Hillder.

"Do not congratulate yourself too early," Kadina retorted. "A death sentence is meaningless only to those already under such a sentence."

"What are you getting at?"

"I am wondering whether you are a major criminal seeking sanctuary among us. There may be some other reason. Whatever it is, you do not hesitate to betray your own kind." He put on the same smile again. "It would be nice to know *why* you have been so coöperative."

"That's an easy one," Hillder said, smiling back in a way that Kadina did not like. "You see, I am a consistent liar."

With that, he left his seat and walked boldly to the exit. The guards led him to his cell.

He was there three days, eating regular meals and enjoying them with irritating gusto, amusing himself writing figures in a little pocketbook, as happy as a legendary space scout named Larry. At the end of that time a ruminative Vard paid a visit.

"I am Bulak. Perhaps you remember me. I was seated at the end of the second row when you were before the commission."

"Four hundred were there," Hillder reminded. "I cannot recall all of them. Only the ones who suffered." He pushed forward a chair. "But never mind. Sit down and put your feet up—if you do have feet inside

those funny looking boots. What can I do for you?"

"I don't know."

"You must have come for some reason, surely?"

Bulak looked mournful. "I'm a refugee from the fog."

"What fog?"

"The one you've spread all over the place." He rubbed a fur-coated ear, examined his fingers, stared at the wall. "The commission's main purpose was to determine relative standards of intelligence, to settle the prime question of whether your kind's cleverness is less than, greater than or equal to our own. Upon that and that alone depends our reaction to contact with another space-conqueror."

"I did my best to help, didn't I?"

"Help?" echoed Bulak as if it were a new and strange word. "Help? Do you call it that? The true test should be that of whether your logic has been extended farther than has ours, whether your premises have been developed to more advanced conclusions."

"Well?"

"You ended up by trampling all over the laws of logic. A bullet cannot kill anybody. After three days fifty of them are still arguing about it and this morning one of them proved that a person cannot climb a ladder. Friends have fallen out, relatives are starting to hate the sight of each other. The remaining three hundred and fifty are in little better state."

"What's troubling them?" in-

quired Hillder with lively interest.

"They are debating veracity with everything but brickbats," Bulak informed, somewhat as if compelled to mention an obscene subject. "You are a consistent liar. Therefore, the statement itself must be a lie. Therefore, you are not a consistent liar. The conclusion is that you can be a consistent liar only by not being a consistent liar. Yet you cannot be a consistent liar without being consistent."

"That's bad," Hillder sympathized.

"It's worse," Bulak gave back. "Because if you really are a consistent liar—which logically is a self-contradiction—none of your evidence is worth a sack of rotten muna-seeds. If you have told us the truth all the way through then your final claim to be a liar must also be true. But, if you are a consistent liar, then none of it is true."

"Take a deep breath," advised Hillder.

"But," continued Bulak, taking a deep breath, "since that final statement must be untrue all the rest may be true." A wild look came into his eyes and he started waving his arms around. "But the claim to consistency makes it impossible for any statement to be assessed as either true or untrue because, on analysis, there is an unresolvable contradiction that—"

"Now, now," said Hillder, patting his shoulder. "It is only natural that the lower should be confused by the higher. The trouble is that you've not yet advanced far enough. Your thinking remains a little primitive." He hesitated, added with the air of mak-

ing a daring guess, "In fact it wouldn't surprise me if you still think logically."

"In the name of the Big Sun," exclaimed Bulak, "how else can we think?"

"Like us," said Hillder. "When you're mentally developed." He strolled twice around the cell, said by way of musing afterthought, "Right now you couldn't cope with the problem of why a mouse when it spins."

"Why a mouse when it spins?" parroted Bulak, letting his jaw hang down.

"Or let's try an easier one, a problem any Earth-child could tackle."

"Such as what?"

"By definition an island is a body of land entirely surrounded by water, isn't it?"

"Yes," admitted Bulak.

"And by definition a lake is a body of water entirely surrounded by land?"

"Yes, that is correct."

"Then let us suppose that the whole of this planet's northern hemisphere is land and all the southern hemisphere is water. Is the northern half an island? Or is the southern half a lake?"

Bulak gave it five minutes' thought. Then he drew a circle on a sheet of paper, divided it, shaded the top half and contemplated the result. In the end he pocketed the paper and got to his feet.

"Some of them would gladly cut your throat but for the possibility that your kind may have a shrewd idea where you are and be capable of

retribution. Others would send you home with honors but for the risk of bowing to inferiors."

"They'll have to make up their minds some day," Hillder commented, refusing to show concern about which way it went.

"Meanwhile," Bulak continued morbidly, "we've had a look over your ship which may be old or new according to whether or not you have lied about it. We can see everything but the engines and remote controls, everything but the things that matter. To determine whether they're superior to ours we'd have to pull the vessel apart, ruining it and making you a prisoner."

"Well, what's stopping you?"

"The fact that you may be bait. If your kind has great power and is looking for trouble, they'll need a pretext. Our victimization of you would provide it. The spark that fires the powder barrel." He made a gesture of futility. "What can one do when working utterly in the dark?"

"One could try settling the question of whether a green leaf remains a green leaf in complete absence of light."

"I have had enough," declared Bulak, making for the door. "I have had more than enough. An island or a lake? Who cares? I am going to see Mondafa."

Mondafa turned up next day in the mid-afternoon. He was a thin, elderly and somewhat wizened specimen with incongruously youthful eyes. Accepting a seat, he studied

Hillder, spoke with smooth deliberation.

"From what I have heard, from all that I have been told, I deduce a basic rule applying to life forms deemed intelligent."

"You deduce it?"

"I have to. There is no choice about the matter. All the life forms we have discovered so far have not been truly intelligent. Some have been superficially so, but not genuinely so. It is obvious that you have had experiences that may come to us sooner or later but have not arrived yet. In that respect we may have been fortunate seeing that the results of such contact are highly speculative. There's just no way of telling."

"And what is this rule?"

"That the governing body of any life form such as ours will be composed of power-lovers rather than of specialists."

"Well, isn't it?"

"Unfortunately, it is. Government falls into the hands of those with desire for authority and escapes those with other interests." He paused, went on, "That is not to say that those who govern us are stupid. They are quite clever in their own particular field of mass-organization. But by the same token they are pathetically ignorant of other fields. Knowing this, your tactic is to take advantage of their ignorance. The weakness of authority is that it cannot be diminished and retain strength. To play upon ignorance is to dull the voice of command."

"Hm-m-m!" Hillder surveyed him

with mounting respect. "You're the first one I've encountered who can see beyond the end of his nose."

"Thank you," said Mondafa. "Now the very fact that you have taken the risk of landing here alone, and followed it up by confusing our leaders, proves that your kind has developed a technique for a given set of conditions and, in all probability, a series of techniques for various conditions."

"Go on," urged Hillder.

"Such techniques must be created empirically rather than theoretically," Mondafa continued. "In other words, they result from many experiences, the correcting of many errors, the search for workability, the effort to gain maximum results from minimum output." He glanced at the other. "Am I correct so far?"

"You're doing fine."

"To date we have established footholds on forty-two planets without ever having to combat other than primitive life. We may find foes worthy of our strength on the forty-third world whenever that is discovered. Who knows? Let us assume for the sake of argument that intelligent life exists on one in every forty-three inhabitable planets."

"Where does that get us?" Hillder prompted.

"I would imagine," said Mondafa thoughtfully, "that the experience of making contact with at least six intelligent life forms would be necessary to enable you to evolve techniques for dealing with their like elsewhere. Therefore, your kind must

have discovered and explored not less than two hundred and fifty worlds. That is an estimate in minimum terms. The correct figure may well be that stated by you."

"And I am not a consistent liar?" asked Hillder, grinning.

"That is beside the point if only our leaders would hold onto sanity long enough to see it. You may have distorted or exaggerated for purposes of your own. If so, there is nothing we can do about it. The prime fact holds fast, namely, that your space-venturings must be far more extensive than ours. Hence you must be older, more advanced and numerically stronger."

"That's logical enough," conceded Hillder, broadening his grin.

"Now don't start on me," pleaded Mondafa. "If you fool me with an intriguing fallacy, I won't rest until I get it straight. And that will do either of us no good."

"Ah, so your intention is to do me good?"

"Somebody has to make a decision seeing that the top brass is no longer capable of it. I am going to suggest that they set you free with our best wishes and assurances of friendship."

"Think they'll take any notice?"

"You know quite well they will. You've been counting on it all along." Mondafa eyed him shrewdly. "They'll grab at the advice to restore their self-esteem. If it works, they'll take the credit. If it doesn't, I'll get the blame." He brooded a few seconds, asked with open curiosity, "Do you find it the same elsewhere?"

"Exactly the same," Hillder assured. "And there is always a Mondafa to settle the issue in the same way. Power and scapegoats go together like husband and wife."

"I'd like to meet my alien counterparts some day." Getting up, he moved to the door. "If I had not come along, how long would you have waited for your psychological mixture to congeal?"

"Until another of your type chipped in. If one doesn't arrive of his own accord, the powers-that-be lose patience and drag one in. The catalyst mined from its own kind. Authority lives by eating its vitals."

"That is putting it paradoxically," Mondafa observed.

Quite an impressive deputation took him back to the ship. All the four hundred were there, about a quarter of them resplendent in uniforms, the rest in their Sunday best. An armed guard juggled guns at barked command. Kadina made an unctuous speech full of brotherly love and the glorious shape of things to come. Somebody presented a bouquet of evil-smelling weeds and Hillder made mental note of the difference in olfactory senses.

Climbing eighty yards to the lock, Hillder looked down. Kadina waved an officious farewell. The crowd chanted, "Hurrah!" in conducted rhythm. He blew his nose on a handkerchief, that being deflatory gesture number nine, closed the lock, sat at the control board.

Tubes fired into a low roar. A cloud of vapor climbed around and sprinkled ground-dirt over the mob. That touch was involuntary and not recorded in the book.

The ship snored into the sky, left the Vard-world far behind. He remained at the controls until free of the entire system's gravitational field. Then he headed for the beacon area and locked the auto-pilot on that course.

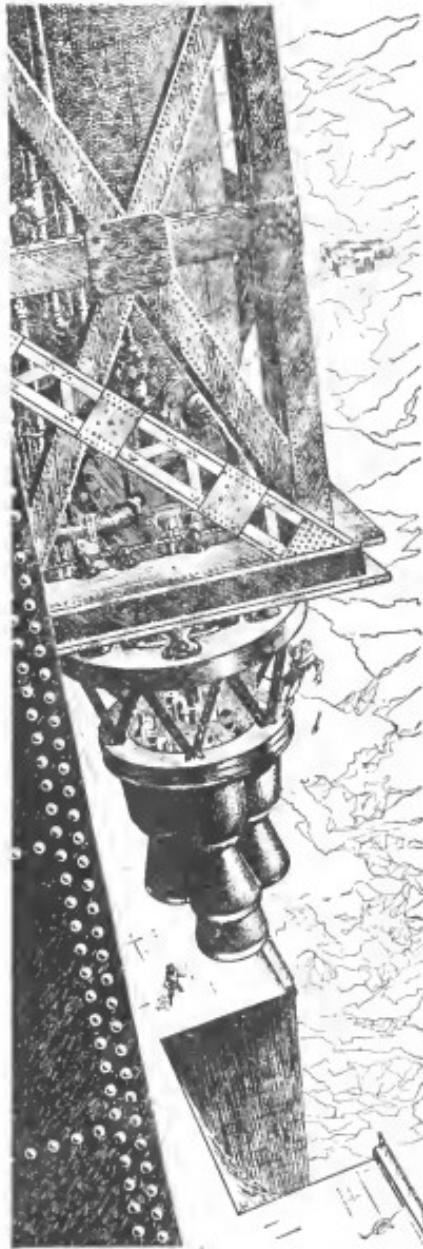
For a while he sat gazing meditatively into star-spangled darkness. After a while he sighed, made notes in his logbook.

"Cube K49, Sector 10, solar-grade D7, third planet. Name Vard. Life form named Vards, cosmic intelligence rating BB, space-going, forty-two colonies. Comment: Softened up."

He glanced over his tiny library fastened to a steel bulkhead. Two tomes were missing. They had swiped the two that were replete with diagrams and illustrations. They had left the rest, having no Rosetta Stone with which to translate cold print. They hadn't touched the nearest volume titled: "Diabologic, the Science of Driving People Nuts."

Sighing again, he took paper from a drawer, commenced his hundredth, two hundredth or maybe three hundredth try at concocting an Aleph number higher than A₁, but lower than C. He mauled his hair until it stuck out in spikes, and, although he didn't know it, he did not look especially well-balanced himself.

THE END



THE TEST STAND

BY LEE CORREY

Of course basically it's rather silly to be more afraid of the monstrous violence of a rocket jet than of a smaller deadly thing. You can't be any deader than dead. But still, the courage required to walk out there . . .

Illustrated by Freas

With rockets making regular trips on schedule out to the space station now, I guess they've licked most of the old problems we had years ago. The rocket motors start smooth and burn smooth, and they don't have mixture-ratio troubles any more. And they've made terrific strides toward increasing combustion efficiency and specific impulse.

Sure, I talk the language. I was a rocket engineer—once. But I just plain didn't have the guts to stay with it, I guess.

We called it "the world's safest business"—until we started building them for men to ride in. The problems got tough then. With instrument and sounding rockets, you can afford a failure now and then. But put a man in the bird and you've got to have a rocket motor that's reliable. It's got to start, run, and stop with complete, one-hundred-per cent reliability. And it's got to do it over and over again.

Some of the techniques had been worked out with rocket planes like the "*Skyrocket*" and the X-1, but scale up from six thousand pounds thrust to something in the neighborhood of several hundred tons, and you'll get some idea of what we were up against.

It may be commonplace today, but we certainly had some rough times with it in the beginning.

I'll admit that it got too tough for me. I finally quit and went to selling refrigerators. But I made the mistake of keeping my drawing board and slide rule. Give those to an engineer—any engineer—and what do you get? Gadgets. That's why I'm building the air-refrigeration units that keep the spacemen cool when the ships come tearing back into the Earth's atmosphere.

I know it's difficult for an engineer to quit the rocket business after the bug has bitten him. It took a good, hard scare to make me quit. I got

scared so badly that I couldn't listen to a motor running in a test stand without shaking in my boots.

Back at White Sands in '65, we finished Test Stand Number Seven. It was a concrete and steel monster perched up on the side of a cliff and tied right to the granite bedrock of the Organ Mountains. We built it specifically to test the rocket motors for Project *Nomad*, the first orbital man-carrying rocket.

We had trouble with that propulsion system for *Nomad*. Today they don't think anything of igniting a whole rack of motors at the same time, but in those days we didn't know much about it. We didn't have catalyst propellants, and we considered ourselves mighty lucky to get one chamber going. Getting a fire started in more than one was considered a miracle.

Those of us with the Rocket Division of the Karlter Ship & Drydock Corporation worked out the multiple start technique for our transoceanic rockets, but the motors would slobber around and waste a couple tons of propellants—liquid oxygen and liquid hydrogen—before the system built up enough thrust to get off the ground.

Then some bright design engineer back in the plant got the brilliant idea that those tons of fuel could be saved if the motors started at full thrust. We got a test directive telling me to work out the details.

Details, mind you. That meant figuring flow rates, mixture ratios, lag times, ignition delay, and valve tim-

ing. Oh, we had a lovely time! We had four blows with single chambers on Test Stand Three before we got an inkling of how to do it. Those were the cut-and-try days; nobody knew very much about what went on inside a rocket motor.

Then Project *Nomad* went crash priority. They suddenly wanted that orbital rocket and wanted it *bad*.

My crew chief on Test Stand Seven didn't like it a bit. "Pete, they oughta give us some time to run cold-flow tests with water before we try to light-off all those chambers at once," he complained to me that day when I told him about it.

"They didn't give us *any* time, Dan," I had to explain. "Karlter and the boys on Staff want the reduced data by the end of the week. That means we get a starting test off today and a full run tomorrow."

"What do them guys want? Miracles?"

"That's our specialty."

Dan went out on the stand to get things ready while I pushed the morning paperwork over my desk in the field office. Just as I got around to tackling the silly problem of having to justify an air-conditioning system for our closed control room buried in the mountainside, Jerry Tedder, the controls technician, came in.

Jerry was a young squirt straight out of I. C. S. who'd been on the stand for about six months. You couldn't exactly call him a greenhorn at rocket motor testing because

you're not a greenhorn when you've gained a deep respect for high-performance rocket engines. But Jerry was still inclined to get panicky at times, so I'd put him under McDougal's wing until he steadied down and got reliable. He was good; he knew *Nomad*'s electrical controls; but he was pretty young. He was also impulsive. In fact, he was definitely that way right then.

"Mr. Edwards, what's the story Dan's been giving me about haywiring the system for a full-thrust start?"

I pushed back my chair, lit up a cigarette, and asked him, "What's the matter, lad? You got troubles? What's wrong with our revised control wiring?"

"Mr. Edwards, it's going to blow all to hell!"

"Is it, now? What makes you think it's going to blow?" I said slowly. Jerry had the tendency to get scared blue when we ran a test that had the slightest amount of danger involved. Right then, it irked me more than usual because I'd spent most of the night before going over the calculations, diagrams, and details of the test. As far as I was concerned, figures based on engineering calculations made from valid data didn't lie.

"The whole system's too marginal right now! If we modify it, we can't expect it to be reliable," he told me, sitting down on the edge of the desk. "And those pressure-regulating valves have a tendency to hang-up on surges."

"Look, youngster," I replied quietly, looking him straight in the eye, "I know what this system will do and what it won't do. That's my job. Now get out there with Mac and rig the sequence controls the way I show in the wiring diagram. That's an order. Understand?"

"But we're liable to get into trouble—"

"Not if you do it right. Let me know when you're ready to run the functional checks." I turned back to my desk work, implying that he'd better hop-to if he wanted to remain on the crew. This wasn't the first time Jerry Tedder had shown he was afraid of that chained monster on the edge of the cliff. The unbridled fury of a rocket motor tied down to a mountainside and shaking the very granite itself is enough to make strong men tremble if they haven't seen it before. But, since Jerry had been with Project *Nomad* for six months, I was beginning to suspect that he just didn't have any guts.

The functional tests went fine. They checked out to the last wiggly ink line on the charts in the control room. Pressures, valve timing, everything was just as I had figured. I finally straightened up and told Dan, "I'll buy it. Start loading propellants."

Dan had to nudge Jerry, who was staring at the charts with a wooden expression. He was scared blue again. When he snapped back to life, he stepped up to the control console

and picked up the public-address mike.

"Attention, all personnel! We are commencing to load propellants! No smoking in the stand area! All arc welders and torches out! Stand is in yellow condition!"

I pulled Dan over into a corner behind the instrument recorders. "Put Mac on the control board today," I instructed him. "Tedder's so shaky he might abort the run."

My crew chief shook his head. "Can't. Mac got an upset stomach and a headache, so I had to send him home."

"When did this happen?"

"Just before the functionals."

"Great! We'll have to leave Jerry where he is then—but you stand next to him and hold his hand, will you?"

"Sure thing," Dan replied with a grin, then added a reminder, "Say, don't forget to call your wife this time."

"Judas! I almost forgot!" I went over to the phone and called Doris.

Ever since Number Seven had been in operation, she'd wanted to bring Bobby down to see his daddy "make smoke." The little guy was pretty sharp for his four years. Whenever Number Seven would make a run, he'd hear the noise and tear out on the front porch of our house, see the big dust cloud, and jump up and down shouting, "That's my Daddy making smoke!"

Doris said she'd be down at the road-block in time, so I got back to the business at hand. Jerry was a bit

steadier now as he operated the banks of switches studding the control console. Looking out through the heavy windows toward the test stand, I could see the frost collecting on the pipes as the tanking progressed. Liquid oxygen and liquid hydrogen were flowing down from the storage areas on the mountain behind and into their separate tanks mounted above the motors in the stand.

When I saw my old green Chevvy pull up at the road-block a half-mile away, I got on the field phone and had them put Doris on.

"Hi, baby! How's Bobby?"

"Excited," she told me.

"I'll bet. He's *really* going to see Daddy making smoke today!"

"You're sure we're not too close. If something happens—"

"Nothing can happen."

"Suppose it explodes?"

"My dear, sweet wife," I kidded her, "do you think I'd let you come this close if I thought it was going to blow up? Just stay where you are, and you'll see a real show. I'll be down after the run."

"Five minutes," Dan warned me.

I hung up and got on the job. The control room was quiet the way it always was before a test, a sort of strained silence with an air of tension all around. The instrument technicians were standing by their recorders, and Jerry was behind the firing console with Dan beside him. The youngster was visibly nervous; there was no color in his cheeks. I knew his symptoms pretty well, and

I was glad old Dan was standing by to hold him in check.

Picking up my pear-shaped cut-off switch, I checked the connections. If something *did* go wrong, I'd have little time to push that switch and shut the motors off. Everybody else in the room had a switch in their hand, too, and I knew they were thinking the same thing.

Taking up my position in front of the heavy windows where I could see, I looked out on the test stand silhouetted against the sky, a fantastic lacework of steel beams a yard thick, pipes, tubing, walkways, and the rocket nozzles with their big tanks above them, all rearing up as high as a ten-story building.

"One minute," Dan announced.

"May we have it quiet, please?" I raised my voice over the noise of the recording instruments. A dead hush fell over the room, broken only by the low voices of the instrument men.

"Energize the cut-off circuit!"

"Cut-off hot!" Jerry sang out, his voice quavering a bit. The little switch in my hand was armed now.

"Instruments zero?"

"Instruments zero!" came the reply from the instrument engineer far back in the control room.

"Twenty-second warning!" I said quietly to Jerry.

Outside, an air horn blasted its voice across the hills and desert.

My hands were sweaty. They always got that way just before a test. I guess it was tension which I never noticed. But Jerry's hands, I could

see they were trembling as he poised them over the switches of the console.

"Flame quench on!" I snapped. A white fountain of water sprang from a pipe and gushed down into the concrete flame pit to protect it from the hell-fire of the rocket flame.

"Close vents and pressurize!"

From the back of the room amidst the banks of recording instruments, someone read the tank pressures by percentage as they came up: "Eighty — eighty-five — ninety — ninety-five — pressurized!"

This was it, the supreme moment of tension and suspense in rocket-motor testing.

"Charts and cameras on! Fire on count-down!" I sang out.

The chart recorders started with a groan accompanied by the *clack-clack-clack* of the timing relays.

"Three — two — one — FIRE!" Jerry leaned on the firing button. He missed it the first time, but got it on the second try.

I switched my eyes to the motors on the test stand.

Nothing happened.

Nothing. No glow of igniters. No cloud of liquid oxygen or hydrogen. No sudden splash of flame laced with shock diamonds. Nothing.

"Misfire! Cut!" I yelled at the same time Jerry and Dan did likewise. I bore down on the switch in my palm.

"No cut-off! No cut-off! It's still hot!" Jerry yelled back, panicky.

"Are the valves frozen?" I wanted to know.

"Valve seat temperatures O. K.!" an instrument man called out.

A plume of vapor suddenly spurted from one of the tanks. "Relief vents are working," Dan reported.

I discovered I was shaking, but managed to pull myself back under control out of sheer necessity. This was no time for me, the test engineer, to lose my head. But it was one of those times when a second stretches out as long as an hour. It seemed to take me forever to move; I was simply rooted to the spot.

Finally, I got out, "Everybody stay put! Emergency condition! Jerry, stay at the board and watch things!" I backed away from the window until I bumped into the control-sequence recorders. Then I got a look at the ink lines on the paper.

"Dan! Come here!" I called.

Stepping away from Jerry's side, my crew chief looked over my shoulder at the chart. "Something shorted," he observed. "Looks like the igniter relay stuck."

"There's more than that," I pointed out. "Instrumentation! What's the pressure upstream of the gas-generator valve?"

"No pressure yet," came the reply.

"Then the pressure regulator jammed," Dan concluded.

My mind ran over the schematic drawings of the electrical and pneumatic control systems of the unit. I came to two conclusions:

The unit would blow sky-high if (a) the sticking igniter relay decided

to work, or (b) the jammed pressure regulating valve suddenly functioned. There wasn't a chance that they would decide to work at the same time, in which case the unit would run instead of blow.

I recalled Jerry had said something earlier about the reliability of the electrical controls and the regs having a tendency to jam on surges. Maybe I should have listened to him; maybe he had more savvy than I thought.

But why couldn't we shut down the unit right now? That didn't make sense to me until Jerry spoke up.

"Mr. Edwards, I think I know where our trouble is."

"Where?"

"Mac put in some jumper wires so we could make our functional checks. He was going to remove them before the test."

But Mac had gone home sick, and nobody had remembered the jumpers! If I hadn't had years of test experience behind me, I would have blown my top over this stupid oversight. But even the most experienced crews pull blunders on occasion; every man has his assigned job, and the tension prior to a run is usually so high that you think of nothing except your specified job as outlined in the "cook book," the operating procedure manual. You haven't got time to worry about everyone else's job.

Sometimes the blunders are funny —like forgetting to turn the recorders on or neglecting to load the film in the cameras. But it's not so funny

when a man has to go outside to disarm a hot, misfired unit.

Jerry went on, "Dan, if you'll take the board here, I'll go and get us out of trouble."

If the misfire had been a shock, this statement from Jerry Tedder completely floored me. Hadn't he been scared blue a minute before? I was too upset right then to make much of it. Instead, I asked, "What do you think you can do?"

"I'll jumper a few things myself. I'll disarm the igniter relay and safety the system."

"That's half the job. Can you release the regulator?"

"I've never done it, but all you have to do is pound on it with a mallet after you've disconnected the line downstream."

"Yeah, but you've got to know *where* to pound," I reminded him. With three-thousand pounds-per-square-inch gas pressure on a regulator, you only have to hit it once in the wrong place to get killed very dead. High-pressure is like an explosive; it's perfectly safe if you know how to handle it, but it can kill you if the tubing bursts.

"I'll be careful," Jerry replied.

I knew he would, but I didn't trust him on pneumatic hardware yet. And he couldn't go out on that stand alone; you can't expect *that* much out of a man.

I don't know what it was. Perhaps it was the fact that I wanted to show Jerry that I wouldn't let him do anything his boss refused to do. I must have been crazy, but I said, "Grab

your hard hat. You jumper that relay first, and I'll release the regulator. Take the board, Dan, and if anything happens, hit the water deluge quick!"

Jerry grabbed a few wires with clips on the ends, and I rummaged around in Dan's tool box until I found a box wrench, a crescent wrench, and a mallet. Thus armed, we walked down the long tunnel cut through the granite of the mountain toward the steel door sealing the far end.

Our steps echoed from the concrete walls, and we didn't say a word. I was sweating pretty badly; I could feel the sweat running down my sides under my shirt. And my stomach was tight. It was the old, familiar signal that comes when danger is around. I don't like it. I didn't like it then, but *somebody* had to go out on that test stand, somebody who knew what he was doing.

Thank God Dan hadn't volunteered to go! I might have taken him up on it!

Jerry pulled the door open with a clang and we stepped out into the afternoon sunlight.

As we approached the stand, I suddenly realized that I no longer had the protection of the control room around me. I was out in the open. If the unit fired now, we'd be shaken up pretty badly; but if it exploded, we were through.

Test stands had been beautiful things to me until that moment. All at once, that gray mass of steel and concrete was ugly. It had no grace

in its lines; it was built to keep the tons of thrust from pushing the motors and tanks toward the sky. It was bulky, massive, solid, forbidding, and I hated it.

I got one look at the bottom of the mountain and saw my green Chevvy and a bunch of people standing around—waiting. Doris and Bobby were down there, and if we had an explosion, they were too close! Sure, I hadn't expected an explosion; if things had gone right, there wouldn't have been a chance. But as I thought of the tons of liquid oxygen and hydrogen in those tanks—equal to a dozen times the force of a like amount of TNT if they mixed and ignited—I wanted to yell to them to run. But I couldn't. I couldn't even walk. I just stood in my tracks.

Jerry went a few steps ahead of me, then turned to look back. "Come on, Pete," he urged.

I was on a crate of mental eggs as we got to the base of the stand and started up the ladder. I was shaking a little, but I rationalized that I was right in the middle of things now; I had to take whatever came.

We climbed up to the electrical control box, and Jerry plugged in his telephone headset. "O. K., Dan," he told the crew chief inside the control room, "I'm disarming the igniter circuit."

"Careful," I warned him unnecessarily. "Don't jar that box, or the relay is liable to function."

He nodded and gingerly started to remove the cover. If he had been shaking in the control room because

of fear, it wasn't obvious now; his hands were steady and his movements careful as he lifted off the cover and set it on the steel grating of the walkway. Carefully, he took one of the clip wires from his pocket and connected one end.

There were lines in his face I had never seen before, and sweat was standing out on his forehead. I think I detected a split-second of hesitation before he connected the other end of the clip wire. But he looked carefully at the maze of wires and connections, then slowly reached in, the clip opened between two fingers.

He came out of there in a hurry, so fast that I thought something was wrong. I was all ready to hit the deck, useless as it might have been. "Got it!" he snapped. "Igniter disarmed! Hold everything for a minute!" Working rapidly now, he clipped on several more jumpers and removed some that were already there.

I felt partially relieved. Half the job was done. He stepped back and said to Dan on the phones, "O.K., the unit is electrically safe. No, no! Don't try the cut-off switch! That regulator's still hung-up!" Then he turned to me.

That was my cue. I walked out on the platform to the unit and started tracing pneumatic lines. The tense, vibrant hiss of compressed gas was all around. As I took out my box wrench to loosen the B-nut on the fitting, the tank relief valve let loose just over my head.

I dropped the wrench. It fell through the grating and bounced on the platform below. It slipped through the grating there and fell . . . and fell . . . and fell down into the flame pit. After seconds, it bounced off the bottom over a hundred feet down.

Without the correct wrench, I was forced to use the adjustable crescent wrench—the "knuckle-buster" so maligned by mechanics.

The fitting came loose without trouble, so I moved around to where I could get at the regulator. In order to reach it, I had to clamber off the platform onto the thrust mount and stand on a narrow beam. Since I had to swing the mallet, I was forced to hang on with only one hand. I didn't look down; it was a clear fall to the bottom of the pit.

I gave the regulator a careful visual check, but I didn't touch it. I had to free it first. Aiming closely, I swung the mallet back.

A ton-and-a-half of pressure on each square-inch of surface there! If I missed, too bad. Five hundred pounds of pressure had been known to tear a man in half.

What in blue blazes, I thought savagely, made me come out here? This was no place for a man with a wife and kid! This was the sort of stuff a crazy guy with no responsibilities does!

Hit it, boy! But don't miss!

I got it squarely on the first swing. It released. The sharp, hissing roar of low-pressure gas coming out the end of the disconnected tube deaf-

ened me, but it was music to my ears right then.

We canceled the test that day and pumped the propellants back into their storage tanks where they were safe.

Crash program or not, we couldn't have made a run that day.

I guess I shook pretty badly for about fifteen minutes, although I hadn't been shaking when the boys tore me loose from where I had "frozen" on my lofty perch over the flame pit.

After three chain cigarettes and two cups of very black coffee, I went down to see Doris and Bobby.

They were disappointed, of course, but I didn't tell them what had gone

on. No use worrying them about it. But Bobby was in tears.

"Daddy didn't make smoke. Daddy didn't make any smoke at all!"

I swung him up into my arms. "Sorry, Bozo. I know Daddy didn't make smoke."

I didn't add a fervent "Thank God!" The smoke might have been me.

It was never the same after that, not for an old codger like me. I stuck to my desk and turned the stand over to the younger boys. As far as I'm concerned, the test stands are strictly for the youngsters because they're something more than rocket-test stands. They test men, too.

THE END

IN TIMES TO COME

Next month we start a new novel by Poul Anderson—"The Long Way Home." Usually I can name the particular feature that makes a novel worth running; this time the reason is a complex interaction of so many factors I can't do that. Kelly Freas did a cover that beautifully typifies the story—and the situation. It's got strings running every which way—the complex network of interacting controls, no one of which is *the* factor, yet all of which are key factors. There's a trigger factor, of course—the arrival, in a culture five thousand years hence, of a ship from the Twenty-first Century. The ship had been exploring, and had an alien aboard—and, in the Seventy-first Century world of electronic devices, the alien turned out to have a mental ability to paralyze any electronic device from a distance.

That was just the trigger it took to make the whole, tensely cross-balanced system of power politics explode!

Incidentally—Aesop was a philosopher, and Aesop was a slave. Ever wondered about the philosophy of an intelligent, courageous and wise slave? Poul has a neat little item that'll throw you a curve on that line of thought!

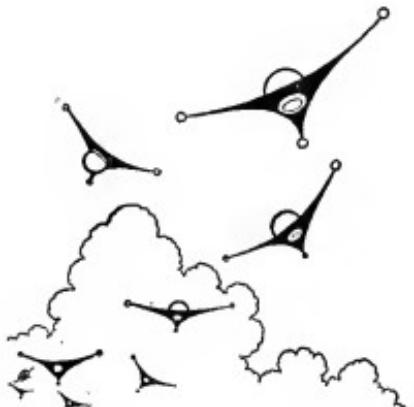
THE EDITOR.

TIME CRIME

BY H. BEAM PIPER

Conclusion. *It would be impossible to hide a major business enterprise, criminal type, in any ordinary civilization. But when you can be hiding in any of a googool of alternative time-tracks—*

Illustrated by Freas



A wise parasite never injures its host; a really wise parasite never reveals its existence. Twelve thousand years ago, confronted with worldwide exhaustion of natural resources, the people of the First Probability Level had developed a method of physical transposition to other time lines of alternate probability. Since then, they had been systematically and secretly exploiting a near-infinity of parallel worlds in a second, lateral, time dimension. Over the millennia, they learned caution and developed a sense of responsibility and a reasonably high ethical standard in their dealings with the unsuspecting peoples outtime, and, because some few would always be incautious, irresponsible, unethical, there was the Para-

time Police, charged with the protection of Paratimers outtime, with suppressing crimes against outtime natives, and, first, last and always, with maintaining the secret of paratemporal transposition.

VERKAN VALL, Special Assistant to TORTHA KARF, Chief of Paratime Police, is about to start on a long-overdue vacation outtime with his wife, HADRON DALLA, when he is asked to investigate and evaluate a report that has come in from the barbaric Third Level Esaron Sector. A Paratime Police field-agent, SKORDRAN KIRV, on leave and employed as guard captain on a Paratime-operated fruit plantation in western North America, has discovered that a hundred slaves recently purchased from a local slave-dealer, CORU-HIN-IRIGOD, are Kharandas, people from the Ganges Valley on the Fourth Level Kholghoor Sector. The obvious implication being that they have been transposed to the Esaron Sector and sold by criminal Paratimers, he has reported his discovery, reverted to police status, and been confirmed in local charge of the investigation. Tortha Karf wants to know if this paratemporal slave trade is an isolated incident, to be dealt with in a routine manner, or a large-scale operation presenting a serious threat to the Paratime Secret at this time.

At first resentful, Dalla agrees to accompany Vall to the Esaron Sector, in order that they may begin their vacation as soon as her husband has accomplished his mission for Tortha

Karf. A psychic-researcher, she has spent some time on the Kholghoor Sector, knows the language and mental attitudes of the natives, and is a qualified narco-hypnotic interrogator. While assisting Vall in interviewing the slaves, her resentment is replaced by sympathy for them, and by horror and indignation at the crimes her own people have perpetrated against them.

It is, as Tortha Karf had feared, the work of a large and well-organized gang, with a number of outtime bases and considerable air transport and paratemporal transposition equipment, who appear to have been operating unsuspected for a long time. These particular slaves had been serfs on the estate of a Kharanda noble; they had been made captive when Kholghoor Sector India had been overrun by the nomadic Croutha barbarians. Small discrepancies in their stories indicate that they come from at least two different time lines, but all agree that the Croutha have sold them to strangers known as the Wizard Traders, who are obviously First Level Paratimers and who, in return, are supplying the Croutha with some sort of crude firearms, apparently flintlocks. It also appears from their stories that they have been transposed to some other time line, possibly on the uninhabited Fifth Level, airlifted from India to the American West Coast, and then transposed in batches to the Third Level Esaron Sector. On this particular Esaron time line, the slavers' local outlet is the chief of the Calera brig-

ands, NEBU-HIN-ABENOZ, Coru-bin-Irigod's uncle.

Narco-hypnotic interrogation of the Caleras, who have been detained at the plantation, substantiates this; they describe how Nebu-bin-Abenoz has been obtaining outland slaves speaking strange languages from some mysterious source in the mountains near his town of Careba for years. An operation is planned by which it is hoped to trap the Paratime slavers when they make their next delivery of slaves. Coru-bin-Irigod and his men are to be given hypnotic memory-obliteration of their arrest, and furnished pseudo-memories, so that they will accept a couple of Paratime Police detectives as friendly traders from the north, and will vouch for them as such at Careba. These detectives, carrying midget radios, will maintain contact with a force of Paratime Police in the hills outside Careba, and will alert them when Nebu-bin-Abenoz starts for another rendezvous with the Paratime slavers.

Having reported that the paratemporal slave trade is a really serious matter, requiring extraordinary measures, Vall and Dalla consult with RANTHA JARD, Sector-Regional Subchief for Kholgboor Sector India, on means of identifying the time lines on which the Wizard Traders are operating. As firearms are unknown on the Kholgboor Sector and as there have been no reports of firearms in the hands of the Croutba, it is evident that they are working on time lines on which there

has been no legitimate paratemporal activity. As there are about three billion time lines on the Kholgboor Sector belt on which the Croutba invasion is occurring, random search with paratemporal auto-return photographic balls for evidence of Croutba possession of firearms seems like a hopeless undertaking. Dalla suggests questioning the slaves about their religious beliefs; otherwise culturally uniform, the Kholgboor Sector is broken into many belts of differing religious sects.

While Vall and Dalla are outtime, a serious political crisis is developing at the First Level Home Time Line metropolis of Dbergabar. A sensation-mongering newscaster, YANDAR YADD, has found out about the slave trade through a compensation claim made on the Paratime Commission by Consolidated Outtime Foodstuffs, whose slaves have been impounded, and when he breaks the story an uproar begins in Executive Council. One of the Councilmen, an Opposition leader named SALGATH TROD, is involved with the paratemporal crime ring; he is ordered, through a mysterious intermediary, to exploit the Council crisis, attack Tortba Karf and the Paratime Police from the floor, and attempt to impede the investigation by demanding a confidence vote.

Skordran Kirv's two detectives, posing as traders, accompany Coru-bin-Irigod and his party return to Careba, with a pack-train loaded with weapons and ammunition of the finest local types. They are welcomed

by Nebu-bin-Abenoz, who tells them that, while no more of the outland slaves such as Coru-bin-Irigod sold to the fruit plantation are now available, there will be plenty more in eight days. As they are relaxing in the patio where Nebu-bin-Abenoz holds court among his rascally subjects, three strangers enter, claiming to be in search of a female slave for the son of their king. In the midst of a discussion with Nebu-bin-Abenoz, all three of them suddenly draw knives and spring upon him, slashing the Caldera chief to death. When the others rush to overcome them, all three take poison and die instantly. The poison is identifiable only to the two disguised Paratimers; it is a First Level product.

PART 2

It was full daylight, but the sun was hidden; a thin rain fell on the landing ground at Police Terminal Dhergabar Equivalent when Vall and Dalla left the rocket. Across the black lava-like pavement, they could see the bulky form of Tortha Karf, hunched under a long cloak, with his flat cap pulled down over his brow. He shook hands with Vall and kissed cheeks with Dalla when they joined him.

"Car's over here," he said, nodding toward the waiting vehicle. "Yesterday wasn't one of our better days, was it?"

"No, it wasn't," Vall agreed. They climbed into the car, and the driver lifted straight up to two thousand feet and turned, soaring

down to land on the Chief's Headquarters Building, a mile away. "We're not completely stopped, sir. Ranthal Jard is working on a few ideas that may lead him to the Kholghoor time lines where the Wizard Traders are operating. If we can't get them through their output, we may nail them at the intake."

"Unless they've gotten the wind up and closed down all their operations," Tortha Karf said.

"I doubt if they've done that, Chief," Vall replied. "We don't know who these people are, of course, and it's hard to judge their reactions, but they're willing to take chances for big gains. I believe they think they're safe, now that they've closed out the compromised time line and killed the only witness against them."

"Well, what's Ranthal Jard doing?"

"Trying to locate the subsector and probability belt from what the slaves can tell him about their religious beliefs, about the local king, and the prince of Jhirda, and the noble families of the neighborhood," Vall said. "When he has it localized as closely as he can, he's going to start pelting the whole paratemporal area with photographic auto-return balls dropped from aircars on Police Terminal over the spatial equivalents of a couple of Croutha-conquered cities. As soon as he gets a photo that shows Croutha with firearms, he'll have a Wizard Trader time line."

"Sounds simple," the Chief said.

The car landed, and he helped Dalla out. "I suppose both you and he know how many chances against one he has of finding anything." They went over to an antigrav-shaft and floated down to the floor on which Tortha Karf had a duplicate of the office in the Paratime Building on Home Time Line. "It's the only chance we have, though."

"There's one thing that bothers me," Dalla said, as they entered the office and went back behind the horse-shoe-shaped desk. "I understand that the news about this didn't break on Home Time Line till the late morning of One-Six-One Day. Nebu-hin-Abenoz was murdered at about 1700 local time, which would be 0100 this morning Dhergaran time. That would give this gang fourteen hours to hear the news, transmit it to their base, and get these three men hypno-conditioned, disguised, transposed to this Esaron Sector time line, and into Careba." She shook her head. "That's pretty fast work."

Tortha Karf looked sidewise at Verkan Vall. "Your girl has the makings of a cop, Vall," he commented.

"She's been a big help, on Esaron and Kholghoor Sectors," Vall said. "She wants to stay with it and help me; I'll be very glad to have her with me."

Tortha Karf nodded. He knew, too, that Dalla wouldn't want to have to go back to Home Time Line and wait the long investigation out.

"Of course; we can use all the help we can get. I think we can get a lot

from Dalla. Fix her up with some kind of a title and police status—technical-expert assistant, or something like that." He clasped hands, man-fashion, with her. "Glad to have you on the cops with us, Dalla," he said. Then he turned to Vall. "There was almost twenty-four hours between the time I heard about this and when this blasted Yandar Yadd got hold of the story. Of all the infernal, irresponsible—" He almost choked with indignation. "And it was another fourteen hours between the time Skordran sent in his report and I heard about it."

"Golzan Doth sent in a report to his company about the same time Skordran Kirv made his first report to his Sector-Regional Subchief. Vall mentioned.

"That might be it," Tortha Karf considered. "I wish there were another explanation, because that implies a very extensive intelligence network, which means a big organization. But I'm afraid that's it. I wish I could pull in everybody in Consolidated Outtime Foodstuffs who handled that report, and narco-hypnotize them. Of course, we can't do things like that on Home Time Line, and with the political situation what it is now—"

"Why, what's been happening, Chief?"

Tortha Karf swore with weary bitterness. "Salgath Trod's what's been happening. At first, after Yandar Yadd broke the story on the air, there was just a lot of unorganized Oppo-

sition sniping in Council; Salgath waited till the middle of the afternoon, when the Management members were beginning to rally, and took the floor. The Centrists and Right Moderates were trying the appeal-to-reason approach; that did as much good as trying to put out a Fifth Level forest fire with a hand-extinguisher. Finally, Salgath got a motion of censure against the Management recognized. That means a confidence vote in ten days. Salgath has a rabble of Leftists and dissident Centrists with him; I doubt if he can muster enough votes to overturn the Management, but it's going to make things rough for us."

"Which may be just the reason Salgath started this uproar," Vall suggested.

"That," Tortha Karf said, "is being considered; there is a discreet inquiry being made into Salgath Trod's associates, his sources of income, and so on. Nothing has turned up, as yet, but we have hopes."

"I believe," Vall said, "that we have a better chance right on Home Time Line than outtime."

Tortha Karf looked up sharply. "So?" he asked.

Vall was stuffing tobacco into a pipe. "Yes, Chief. We have a big criminal organization—let's call it the Slave Trust, for a convenience-label. The people who run it aren't stupid. The fact that they've been shipping slaves to the Esaron Sector for ten years before we found out about it proves that. So does the speed with which they got rid of this

Nebu-hin-Abenoz, right in front of a pair of our detectives. For that matter, so does the speed with which they moved in to exploit this Croutha invasion of Kholghoor Sector India.

"Well, I've studied illegal and subversive organizations all over paratime, and among the really successful ones, there are a few uniform principles. One is cellular organization—small groups, acting in isolation from one another, coöperating with other cells but ignorant of their composition. Another is the principle of no upward contact—leaders contacting their subordinates through contact-blocks and ignorant intermediaries. And another is a willingness to kill off anybody who looks like a potential betrayer or forced witness. The late Nebu-hin-Abenoz, for instance.

"I'll be willing to bet that if we pick up some of these Wizard Traders, say, or a gang that's selling slaves to some Nebu-hin-Abenoz personality on some other time line, and narco-hypnotize them, all they'll be able to do will be name a few immediate associates, and the group leader will know that he's contacted from time to time by some stranger with orders, and that he can make emergency contacts only through some blind accommodation-address. The men who are running this are right on Home Time Line, many of them in positions of prominence, and if we can catch one of them and narco-hyp him, we can start a chain-reaction of disclosures all through this Slave Trust."

"How are we going to get at these top men?" Tortha Karf wanted to know. "Advertise for them on telecast?"

"They'll leave traces; they won't be able to avoid it. I think, right now, that Salgath Trod is one of them. I think there are other prominent politicians, and business people. Look for irregularities and peculiarities in outtime currency-exchange transactions. For instance, to sections in Esaron Sector *obus*. Or big gold bullion transactions."

"Yes. And if they have any really elaborate outtime bases, they'll need equipment that can only be gotten on Home Time Line," Tortha Karf added. "Paratemporal conveyer parts, and field-conductor mesh. You can't just walk into a hardware store and buy that sort of thing."

Dalla leaned forward to drop her cigarette ash into a tray.

"Try looking into the Bureau of Psychological Hygiene," she suggested. "That's where you'll really strike it rich."

Vall and Tortha Karf both turned abruptly and looked at her for an instant.

"Go on," Tortha Karf encouraged. "This sounds interesting."

"The people back of this," Dalla said, "are definitely classifiable as criminals. They may never perform a criminal act themselves, but they give orders for and profit from such acts, and they must possess the motivation and psychology of criminals. We define people as criminals when

they suffer from psychological aberrations of an antisocial character, usually paranoid—excessive egoism, disregard for the rights of others, inability to recognize the social necessity for mutual coöperation and confidence. On Home Time Line, we have universal psychological testing, for the purpose of detecting and eliminating such characteristics."

"It seems to have failed in this case," Tortha Karf began, then snapped his fingers. "Of course! How blasted silly can I get, when I'm not trying?"

"Yes, of course," Verkan Vall agreed. "Find out how these people missed being spotted by psychotesting; that'll lead us to *who* missed being tested adequately, and also *who* got into the Bureau of Psychological Hygiene *who didn't belong there*."

"I think you ought to give an investigation of the whole BuPsychHyg setup very high priority," Dalla said. "A psychotest is only as good as the people who give it, and if we have criminals administering these tests—"

"We have our friends on Executive Council," Tortha Karf said. "I'll see that that point is raised when Council re-convenes." He looked at the clock. "That'll be in three hours, by the way. If it doesn't accomplish another thing, it'll put Salgath Trod in the middle. He can't demand an investigation of the Paratime Police out of one side of his mouth and oppose an investigation of Psychological Hygiene out of the other."

Now what else have we to talk about?"

"Those hundred slaves we got off the Esaron Sector," Vall said. "What are we going to do with them? And if we locate the time line the slavers have their bases on, we'll have hundreds, probably thousands, more."

"We can't sort them out and send them back to their own time lines, even if that would be desirable," Tortha Karf decided. "Why, settle them somewhere on the Service Sector. I know, the Paratime Transposition Code limits the Service Sector to natives of time lines below second-order barbarism, but the Paratime Transposition Code has been so badly battered by this business that a few more minor literal infractions here and there won't make any difference. Where are they now?"

"Police Terminal, Nharkan Equivalent."

"Better hold them there, for the time being. We may have to open a new ServSec time line to take care of all the slaves we find, if we can locate the outtime base line these people are using—Vall, this thing's too big to handle as a routine operation, along with our other work. You take charge of it. Set up your headquarters here, and help yourself to anything in the way of personnel and equipment you need. And bear in mind that this confidence vote is coming up in ten days—on the morning of One-Seven-Two Day. I'm not asking for any miracles, but if we don't get this thing cleared up by then, we're in for trouble."



"I realize that, sir. Dalla, you'd better go back to Home Time Line, with the Chief," he said. "There's nothing you can do to help me, here, at present. Get some rest, and then try to wangle an invitation for the two of us to dinner at Thalvan Dras' apartments this evening." He turned back to Tortha Karf. "Even if he never pays any attention to business, Dras still owns Consolidated Outtime Foodstuffs," he said. "He might be able to find out, or help us find out, how the story about those slaves leaked out of his company."

"Well, that won't take much doing," Dalla said. "If there's as much excitement on Home Time Line as I think, Dras would turn somersaults and jump through hoops to get us to one of his dinners, right now."

Salgath Trod pushed the litter of papers and record-tape spools to one side impatiently.

"Well, what else did you expect?" he demanded. "This was the logical next move. BuPsychHyg is supposed to detect anybody who believes in looking out for his own interests first, and condition him into a pious law-abiding sucker. Well, the sacred Bureau of Sucker-Makers slipped up on a lot of us. It's a natural alibi for Tortha Karf."

"It's also a lot of grief for all of us," the young man in the wrap-around tunic added. "I don't want my psychotests reviewed by some duty-struck bigot who can't be reasoned with, and neither do you."

"I'm getting something organized

to counter that," Salgath Trod said. "I'm going to attack the whole scientific basis of psychotesting. There's Dr. Frasthor Klav; he's always contended that what are called criminal tendencies are the result of the individual's total environment, and that psychotesting and personality-analysis are valueless, because the total environment changes from day to day, even from hour to hour—"

"That won't do," the nameless young man who was the messenger of somebody equally nameless retorted. "Frasthor's a crackpot; no reputable psychologist or psychiatrist gives his opinions a moment's consideration. And besides, we don't want to attack Psychological Hygiene. The people in it with whom we can do business are our safeguard; they've given all of us a clean bill of mental health, and we have papers to prove it. What we have to do is to make it appear that that incident on the Esaron Sector is all there is to this, and also involve the Paratime Police themselves. The slavers are all paracops. It isn't the fault of BuPsychHyg, because the Paratime Police have their own psychotesting staff. That's where the trouble is; the paracops haven't been adequately testing their own personnel."

"Now how are you going to do that?" Salgath Trod asked disdainfully.

"You'll take the floor, the first thing tomorrow, and utilize these new revelations about the Wizard Traders. You'll accuse the Paratime Police of being the Wizard Traders them-

selves. Why not? They have their own paratemporal transposition equipment shops on Police Terminal, they have facilities for manufacturing duplicates of any kind of outtime items, like the firearms, for instance, and they know which time lines on which sectors are being exploited by legitimate paratime traders and which aren't. What's to prevent a gang of unscrupulous paracops from moving in on a few unexploited Kholghoor time lines, buying captives from the Croutha, and shipping them to the Esaron Sector?"

"Then why would they let a thing like this get out?" Salgath Trod inquired.

"Somebody slipped up and moved a lot of slaves onto an exploited Esaron time line. Or, rather, Consolidated Outtime Foodstuffs established a plantation on a time line they were shipping slaves to. Parenthetically, that's what really did happen; the mistake our people made was in not closing out that time line as soon as Consolidated Foodstuffs moved in," the young man said.

"So, this Skordran Kirv, who is a dumb boy who doesn't know what the score is, found these slaves and blatted about it to this Golzan Doth, and Golzan reported it to his company, and it couldn't be hushed up, so now Tortha Karf is trying to scare the public with ghost stories about a gigantic paratemporal conspiracy, to get more appropriations and more power."

"How long do you think I'd get

away with that?" Salgath Trod demanded. "I can only stretch parliamentary immunity so far. Sooner or later, I'd have to make formal charges to a special judicial committee, and that would mean narco-hypnosis, and then it would all come out."

"You'll have proof," the young man said. "We'll produce a couple of these Kharandas whom Verkan Vall didn't get hold of. Under narco-hypnosis, they'll testify that they saw a couple of Wizard Traders take their robes off. Under the robes were Paratime Police uniforms. Do you follow me?"

Salgath Trod made a noise of angry disgust.

"That's ridiculous! I suppose these Kharandas will be given what is deludedly known as memory obliteration, and a set of pseudo-memories; how long do you think that would last? About three ten-days. There is no such thing as memory obliteration; there's memory-suppression, and pseudo-memory overlay. You can't get behind that with any quickie narco-hypnosis in the back room of any police post, I'll admit that," he said. "But a skilled psychiatrist can discover, inside of five minutes, when a narco-hypnotized subject is carrying a load of false memories, and in time, and not too much time, all that top layer of false memories and blockages can be peeled off. And then where would we be?"

"Now wait a minute, Councilman. This isn't just something I dreamed up," the visitor said. "This was de-

cided upon at the top. At the very top."

"I don't care whose idea it was," Salgath Trod snapped. "The whole thing is idiotic, and I won't have anything to do with it."

The visitor's face froze. All the respect vanished from his manner and tone; his voice was like ice cakes grating together in a winter river.

"Look, Salgath; this is an Organization order," he said. "You don't refuse to obey Organization orders, and you don't quit the Organization. Now get smart, big boy; do what you're told to." He took a spool of record tape from his pocket and laid it on the desk. "Outline for your speech; put it in your own words, but follow it exactly." He stood watching Salgath Trod for a moment. "I won't bother telling you what'll happen to you if you don't," he added. "You can figure that out for yourself."

With that, he turned and went out the private door. For a while, Salgath Trod sat staring after him. Once he put his hand out toward the spool, then jerked it back as though the thing were radioactive. Once he looked at the clock; it was just 1600.

The green aircar settled onto the landing stage; Verkan Vall, on the front seat beside the driver, opened the door.

"Want me to call for you later, Assistant Verkan?" the driver asked.

"No thank you, Drenth. My wife

and I are going to a dinner-party, and we'll probably go night-clubbing afterward. Tomorrow morning, all the anti-Management commentators will be yakking about my carousing around when I ought to be battling the Slave Trust. No use advertising myself with an official car, and giving them a chance to add, 'at public expense!'"

"Well, have some fun while you can," the driver advised, reaching for the car-radio phone. "Want me to check you in here, sir?"

"Yes, if you will. Thank you, Drenth."

Kandagro, his human servant, admitted him to the apartment six floors down.

"Mistress Dalla is dressing," he said. "She asked me to tell you that you are invited to dinner, this evening, with Thalvan Dras at his apartment."

Vall nodded. "I'll talk to her about it now," he said. "Lay out my dress uniform; short jacket, boots and breeches, and needler."

"Yes, master; I'll go lay out your things and get your bath ready."

The servant turned and went into the alcove which gave access to the dressing rooms, turning right into Vall's. Vall followed him, turning left into his wife's.

"Oh, Dalla!" he called.

"In here!" her voice came out of her bathroom.

He passed through the dressing room, to find her stretched on a plastic-sheeted couch, while her maid, Rendarra, was rubbing her body vig-

orously with some pungent-smelling stuff about the consistency of machine-grease. Her face was masked in the stuff, and her hair was covered with an elastic cap. He had always suspected that beauty was the real feminine religion, from the willingness of its devotees to submit to martyrdom for it. She wiggled a hand at him in greeting.

"How did it go?" she asked.

"So-so. I organized myself a sort of miniature police force within a police force and I have liaison officers in every organization down to Sector Regional so that I can be informed promptly in case anything new turns up anywhere. What's been happening on Home Time Line? I picked up a news-summary at Paratime Police Headquarters; it seems that a lot more stuff has leaked out. Kholghoor Sector, Wizard Traders and all. How'd it happen?"

Dalla rolled over to allow Rendarra to rub the blue-green grease on her back.

"Consolidated Outtime Foodstuffs let a gang of reporters in, today. I think they're afraid somebody will accuse them of complicity, and they want to get their side of it before the public. All our crowd are off that time line except a couple of detectives at the plantation."

"I know." He smiled; Dalla was thinking of the Paratime Police as "our crowd" now. "How about this dinner at Dras' place?"

"Oh, that was easy." She shifted position again. "I just called Dras up and told him that our vacation

was off, and he invited us before I could begin hinting. What are you going to wear?"

"Short-jacket greens; I can carry a needler with that uniform, even wear it at the table. I don't think it's smart for me to run around unarmed, even on Home Time Line. Especially on Home Time Line," he amended. "When's this affair going to start, and how long will Rendarra take to get that goo off you?"

Salgath Trod left his aircar at the top landing stage of his apartment building and sent it away to the hangars under robot control; he glanced about him as he went toward the antigrav shaft. There were a dozen vehicles in the air above; any of them might have followed him from the Paratime Building. He had no doubt that he had been under constant surveillance from the moment the nameless messenger had delivered the Organization's ultimatum. Until he delivered that speech, the next morning, or manifested an intention of refusing to do so, however, he would be safe. After that—

Alone in his office, he had reviewed the situation point by point, and then gone back and reviewed it again; the conclusion was inescapable. The Organization had ordered him to make an accusation which he himself knew to be false; that was the first premise. The conclusion was that he would be killed as soon as he had made it. That was the trouble with being mixed up with that kind of people—you were expendable, and

sooner or later, they would decide that they would have to expend you. And what could you do?

To begin with, an accusation of criminal malfeasance made against a Management or Paratime Commission agency on the floor of Executive Council was tantamount to an accusation made in court; automatically, the accuser became a criminal prosecutor, and would have to repeat his accusation under narco-hypnosis. Then the whole story would come out, bit by bit, back to its beginning in that first illegal deal in Indo-Turanian opium, diverted from trade with the Khiftan Sector and sold on Second Level Luvarian Empire Sector, and the deals in radioactive poisons, and the slave trade. He would be able to name few names—the Organization kept its activities too well compartmented for that—but he could talk of things that had happened, and when, and where, and on what paratemporal areas.

No. The Organization wouldn't let that happen, and the only way it could be prevented would be by the death of Salgath Trod, as soon as he had made his speech. All the talk of providing him with corroborative evidence was silly; it had been intended to lead him more trustingly to the slaughter. They'd kill him, of course, in some way that would be calculated to substantiate the story he would no longer be able to repudiate. The killer, who would be promptly rayed dead by somebody else, would wear a Paratime Police uniform, or something like that. That

was of no importance, however; by then, he'd be beyond caring.

One of his three ServSec Prole servants—the slim brown girl who was his housekeeper and hostess, and also his mistress—admitted him to the apartment. He kissed her perfunctorily and closed the door behind him.

"You're tired," she said. "Let me call Nindrandigro and have him bring you chilled wine; lie down and rest until dinner."

"No, no; I want brandy." He went to a cellaret and got out a decanter and goblet, pouring himself a drink. "How soon will dinner be ready?"

The brown girl squeezed a little golden globe that hung on a chain around her neck; a tiny voice, inside it, repeated: "Eighteen twenty-three ten, eighteen twenty-three eleven, eighteen twenty-three twelve—"

"In half an hour. It's still in the robo-chef," she told him.

He downed half the goblet-full, set it down, and went to a painting, a brutal scarlet and apple-green abstraction, that hung on the wall. Swinging it aside and revealing the safe behind it, he used his identity-sigil, took out a wad of Paratemporal Exchange Bank notes and gave them to the girl.

"Here, Zinganna; take these, and take Nindrandigro and Calilla out for the evening. Go where you can all have a good time, and don't come back till after midnight. There will be some business transacted here, and I want them out of this. Get them

out of here as soon as you can; I'll see to the dinner myself. Spend all of that you want to."

The girl rifled through the wad of banknotes. "Why, *thank* you, Trod!" She threw her arms around his neck and kissed him enthusiastically. "I'll go tell them at once."

"And have a good time, Zinganna; have the best time you possibly can," he told her, embracing and kissing her. "Now, get out of here; I have to keep my mind on business."

When she had gone, he finished his drink and poured another. He drew and checked his needler. Then, after checking the window-shielding and activating the outside view-screens, he lit a cheroot and sat down at the desk, his goblet and his needler in front of him, to wait until the servants were gone.

There was only one way out alive. He knew that, and yet he needed brandy, and a great deal of mental effort, to steel himself for it. Psycho-rehabilitation was a dreadful thing to face. There would be almost a year of unremitting agony, physical and mental, worse than a Khiftan torture rack. There would be the shame of having his innermost secrets poured out of him by the psychotherapists, and, at the end, there would emerge someone who would not be Salgath Trod, or anybody like Salgath Trod, and he would have to learn to know this stranger, and build a new life for him.

In one of the viewscreens, he saw the door to the service hallway open. Zinganna, in a black evening gown

and a black velvet cloak, and Calilla, the housemaid, in what she believed to be a reasonable facsimile of fashionable First Level dress, and Nindrardigro, in one of his master's evening suits, emerged. Salgath Trod waited until they had gone down the hall to the antigrav shaft, and then he turned on the visiphone, checked the security, set it for sealed beam communication, and punched out a combination.

A girl in a green tunic looked out of the screen.

"Paratime Police," she said. "Office of Chief Tortha."

"I am Executive Councilman Salgath Trod," he told her. "I am, and for the past fifteen years have been, criminally involved with the organization responsible for the slave trade which recently came to light on Third Level Esaron. I give myself up unconditionally; I am willing to make full confession under narco-hypnosis, and will accept whatever disposition of my case is lawfully judged fit. You'll have to send an escort for me; I might start from my apartment alone, but I'd be killed before I got to your headquarters—"

The girl, who had begun to listen in the bored manner of public servants phone girls, was staring wide-eyed.

"Just a moment, Councilman Salgath; I'll put you through to Chief Tortha."

The dinner lacked a half hour of being served; Thalvan Dras' guests

loitered about the drawing room, sampling appetizers and chilled drinks and chatting in groups. It wasn't the artistic crowd usual at Thalvan Dras' dinners; most of the guests seemed to be business or political people. Thalvan Dras had gotten Vall and Dalla into the small group around him, along with pudgy, infantile-faced Brogoth Zaln, his confidential secretary, and Jav-rath Brend, his financial attorney.

"I don't see why they're making such a fuss about it," one of the Banking Cartel people was saying. "Causing a lot of public excitement all out of proportion to the importance of the affair. After all, those people were slaves on their own time line, and if anything, they're much better off on the Esaron Sector than they would be as captives of the Croutha. As far as that goes, what's the difference between that and the

way we drag these Fourth Level Primitive Sector-Complex people off to Fifth Level Service Sector to work for us?"

"Oh, there's a big difference, Farn," Javrath Brend said. "We recruit those Fourth Level Primitives out of probability worlds of Stone Age savagery, and transpose them to our own Fifth Level time lines, practically outtime extensions of the Home Time Line. There's absolutely no question of the Paratime Secret being compromised."

"Beside, we need a certain amount of human labor, for tasks requiring original thought and decision that are beyond the ability of robots, and most of it is work our Citizens simply



wouldn't perform," Thalvan Dras added.

"Well, from a moral standpoint, wouldn't these Esaron Sector people who buy the slaves justify slavery in the same terms?" a woman whom Vall had identified as a Left Moderate Council Member asked.

"There's still a big difference," Dalla told her. "The ServSec Proles aren't beaten or tortured or chained; we don't break up families or separate friends. When we recruit Fourth Level Primitives, we take whole tribes, and they come willingly. And—"

One of Thalvan Dras' black-liveried human servants, of the class under discussion, approached Vall.

"A visiphone call for your lordship," he whispered. "Chief Tortha Karf calling. If your lordship will come this way—"

In a screen-booth outside, Vall found Tortha Karf looking out of the screen; he was seated at his desk, fiddling with a gold multicolor pen.

"Oh, Vall; something interesting has just come up." He spoke in a voice of forced calmness. "I can't go into it now, but you'll want to hear about it. I'm sending a car for you. Better bring Dalla along; she'll want in on it, too."

"Right; we'll be on the top south-west landing stage in a few minutes."

Dalla was still heatedly repudiating any resemblance between the normal First Level methods of labor-recruitment and the activities of the Wizard Traders; she had just finished

the story of the woman whose child had been brained when Vall rejoined the group.

"Dras, I'm awfully sorry," he said. "This is the second time in succession that Dalla and I have had to bolt away from here, but policemen are like doctors—always on call, and consequently unreliable guests. While you're feasting, think commiseratingly of Dalla and me; we'll probably be having a sandwich and a cup of coffee somewhere."

"I'm terribly sorry," Thalvan Dras replied. "We had all been looking forward— Well! Brogoth, have a car called for Vall and Dalla."

"Police car coming for us; it's probably on the landing stage now," Vall said. "Well, good-by, everybody. Coming, Dalla?"

They had a few minutes to wait, under the marquee, before the green police aircar landed and came rolling across the rain-wet surface of the landing stage. Crossing to it and opening the rear door, he put Dalla in and climbed in after her, slamming the door. It was only then that he saw Tortha Karf hunched down in the rear seat. He motioned them to silence, and did not speak until the car was rising above the building.

"I wanted to fill you in on this, as soon as possible," he said. "Your hunch about Salgath Trod was good; just a few minutes before I called you, he called me. He says this slave trade is the work of something he calls the Organization; says he's been taking orders from them for years.

His attack on the Management and motion for a censure-vote were dictated from Organization top echelon. Now he's convinced that they're going to force him to make false accusations against the Paratime Police and then kill him before he's compelled to repeat his charges under narco-hypnosis. So he's offered to surrender and trade information for protection."

"How much does he know?" Vall asked.

Tortha Karf shook his head. "Not as much as he claims to, I suppose; he wouldn't want to reduce his own trade-in value. But he's been involved in this thing for the last fifteen years, and with his political prominence, he'd know quite a lot."

"We can protect him from his own gang; can we protect him from psycho-rehabilitation?"

"No, and he knows it. He's willing to accept that. He seems to think that death at the hands of his own associates is the only other alternative. Probably right, too."

The floodlighted green towers of the Paratime Building were wheeling under them as they circled down.

"Why would they sacrifice a valuable accomplice like Salgath Trod, in order to make a transparently false accusation against us?" Vall wondered.

"Ha, that's our new rookie cop's idea!" Tortha Karf chuckled, nodding toward Dalla. "We got Zortan Harn to introduce an urgent-business motion to appoint a committee to investigate BuPsychHyg, this morning.

The motion passed, and this is the reaction to it. The Organization's scared. Just as Dalla predicted, they don't want us finding out how people with potentially criminal characteristics missed being spotted by psycho-testing. Salgath Trod is being sacrificed to block or delay that."

Vall nodded as the wheels bumped on the landing stage and the antigrav field went off. That was the sort of thing that happened when you started on a really fruitful line of investigation. They got out and hurried over under the marquee, the car lifting and moving off toward the hangars. This was the real break; no matter how this Organization might be compartmented, a man like Salgath Trod would know a great deal. He would name names, and the bearers of those names, arrested and narco-hypnotized, would name other names, in a perfect chain reaction of confessions and betrayals.

Another police car had landed just ahead of them, and three men were climbing out; two were in Paratime Police green, and the third, handcuffed, was in Service Sector Proletarian garb. At first, Vall thought that Salgath Trod had been brought in disguised as a Prole prisoner, and then he saw that the prisoner was short and stocky, not at all like the slender and elegant politician. The two officers who had brought him in were talking to a lieutenant, Sothran Barth, outside the antigrav shaft kiosk. As Vall and Tortha Karf and Dalla walked over, the car which had brought them lifted out.

"Something that just came in from Industrial Twenty-four, Chief," Lieutenant Sothran said in answer to Tortha Karf's question. "May be for Assistant Verkan's desk."

"He's a Prole named Yandragno, sir," one of the policemen said. "Industrial Sector Constabulary grabbed him peddling Martian hellweed cigarettes to the girls in a textile mill at Kangabar Equivalent. Captain Jamzar thinks he may have gotten them from somebody in the Organization."

A little warning bell began ringing in the back of Verkan Vall's mind, but at first he could not consciously identify the cause of his suspicions. He looked the two policemen and their prisoner over carefully, but could see nothing visibly wrong with them. Then another car came in for a landing and rolled over under the marquee; the door opened, and a police officer got out, followed by an elegantly dressed civilian whom he recognized at once as Salgath Trod. A second policeman was emerging from the car when Vall suddenly realized what it was that had disturbed him.

It had been Salgath Trod, himself, less than half an hour ago, who had introduced the term, "the Organization," to the Paratime Police. At that time, if these people were what they claimed to be, they would have been in transposition from Industrial Twenty-four, on the Fifth Level. Immediately, he reached for his needler. He was clearing it of the holster when things began happening.

The handcuffs fell from the "prisoner's" wrists; he jerked a neutron-disruption blaster from under his jacket. Vall, his needler already drawn, rayed the fellow dead before he could aim it, then saw that the two pseudo-policemen had drawn their needlers and were aiming in the direction of Salgath Trod. There were no flashes or reports; only the spot of light that had winked on and off under Vall's rear sight had told him that his weapon had been activated. He saw it appear again as the sights centered on one of the "policemen." Then he saw the other imposter's needler aimed at himself. That was the last thing he expected ever to see, in that life; he tried to shift his own weapon, and time seemed frozen, with his arm barely moving. Then there was a white blur as Dalla's cloak moved in front of him, and the needler dropped from the fingers of the disguised murderer. Time went back to normal for him; he safetied his own weapon and dropped it, jumping forward.

He grabbed the fellow in the green uniform by the nose with his left hand, and punched him hard in the pit of the stomach with his right fist. The man's mouth flew open, and a green capsule, the size and shape of a small bean, flew out. Pushing Dalla aside before she would step on it, he kicked the murderer in the stomach, doubling him over, and chopped him on the base of the skull with the edge of his hand. The pseudo-policeman dropped senseless.

With a handful of handkerchief-

tissue from his pocket, he picked up the disgorged capsule, wrapping it carefully after making sure that it was unbroken. Then he looked around. The other two assassins were dead. Tortha Karf, who had been looking at the man in Proletarian dress whom Vall had killed first, turned, looked in another direction, and then cursed. Vall followed his eyes, and cursed also. One of the two policemen who had gotten out of the aircar was dead, too, and so was the all-important witness, Salgath Trod—as dead as Nebu-hin-Abenoz, a hundred thousand parayears away.

The whole thing had ended within thirty seconds; for about half as long, everybody waited, poised in a sort of action-vacuum, for something else to happen. Dalla had dropped the shoulder-bag with which she had clubbed the prisoner's needler out of his hand, and caught up the fallen weapon. When she saw that the man was down and motionless, she laid it aside and began picking up the glittering or silken trifles that had spilled from the burst bag. Vall retrieved his own weapon, glanced over it, and holstered it. Sothran Barth, the lieutenant in charge of the landing stage, was bawling orders, and men were coming out of the ready-room and piling into vehicles to pursue the aircar which had brought the assassins.

"Barth!" Vall called. "Have you a hypodermic and a sleep-drug ampoule? Well, give this boy a shot; he's only impact-stunned. Be careful of him; he's important." He glanced

around the landing stage. "Fact is, he's all we have to show for this business."

Then he stooped to help Dalla gather her things, picking up a few of them—a lighter, a tiny crystal perfume flask, miraculously unbroken, a face-powder box which had sprung open and spilled half its contents. He handed them to her, while Sothran Barth bent over the prisoner and gave him an injection, then went to the body of the other pseudo-policeman, forcing open his mouth. In his cheek, still unbroken, was a second capsule, which he added to the first. Tortha Karf was watching him.

"Same gang that killed that Carera slaver on Esaron Sector?" he asked. "Of course, exactly the same general procedure. Let's have a look at the other one."

The man in Proletarian dress must have had his capsule between his molars when he had been killed; it was broken, and there was a brownish discoloration and chemical odor in his mouth.

"Second time we've had a witness killed off under our noses," Tortha Karf said. "We're going to have to smarten up in a hurry."

"Here's one of us who doesn't have to, much," Vall said, nodding toward Dalla. "She knocked a needler out of one man's hand, and we took him alive. The Force owes her a new shoulder-bag; she spoiled that one using it for a club."

"Best shoulder-bag we can find you, Dalla," Tortha Karf promised. "You're promoted, herewith, to Spe-

cial Chief's Assistant's Special Assistant— You know, this Organization murder-section is good; they could kill anybody. It won't be long before they assign a squad to us. Blast it, I don't want to have to go around bodyguarded like a Fourth Level dictator, but—"

A detective came out of the control room and approached.

"Screen call for you, sir," he told Tortha Karf. "One of the news services wants a comment on a story they've just picked up that we've illegally arrested Councilman Salgath and are holding him incomunicado and searching his apartment."

"That's the Organization," Vall said. "They don't know how their boys made out; they're hoping we'll tell them."

"No comment," Tortha Karf said. "Call the girl on my switchboard and tell her to answer any other news-service calls. We have nothing to say at this time, but there will be a public statement at . . . at 2330," he decided after a glance at his watch. "That'll give us time to agree on a publicity line to adopt. Lieutenant Sothran! Take charge up here. Get all these bodies out of sight somewhere, including those of Councilman Salgath and Detective Malthor. Don't let anybody talk about this; put a blackout on the whole story. Vall, you and Dalla and . . . oh, you, over there; take the prisoner down to my office. Sothran, any reports from any of the cars that were chasing that fake police car?"

Verkan Vall and Dalla were sitting behind Tortha Karf's desk; Vall was issuing orders over the intercom and talking to the detectives who had remained at Salgath Trod's apartment by visiscreen; Dalla was sorting over the things she had spilled when her bag had burst. They both looked up as Tortha Karf came in and joined them.

"The prisoner's still under the drug," the Chief said. "He'll be out for a couple of hours; the psych-techs want to let him come out of it naturally and sleep naturally for a while before they give him a hypno. He's not a ServSec Prole; uncircumcised, never had any syntho-enzyme shots or immunizations, and none of the longevity operations or grafts. Same thing for the two stiffs. And no identity records on any of the three."

"The men at Salgath's apartment say that his housekeeper and his two servants checked out through the house conveyer for ServSec One-Six-Five, at about 1830," Vall said. "There's a Prole entertainment center on that time line. I suppose Salgath gave them the evening off before he called you."

Tortha Karf nodded. "I suppose you ordered them picked up. The news services are going wild about this. I had to make a preliminary statement, to the effect that Salgath Trod was not arrested, came to Headquarters of his own volition, and is under no restraint whatever."

"Except, of course, a slight case of rigor mortis," Dalla added. "Did you mention that, Chief?"

"No, I didn't." Tortha Karf looked as though he had quinine in his mouth. "Vall, how in blazes are we going to handle this?"

"We ought to keep Salgath's death hushed up, as long as we can," Vall said. "The Organization doesn't know positively what happened here; that's why they're handing out tips to the news services. Let's try to make them believe he's still alive and talking."

"How can we do it?"

"There ought to be somebody on the Force close enough to Salgath Trod's anthropometric specifications that our cosmeticians could work him over into a passable impersonation. Our story is that Salgath is on Pol-Term, undergoing narco-hypnosis. We will produce an audio-visual of him as soon as he is out of narco-hyp. That will give us time to fix up an impersonator. We'll need a lot of sound-recordings of Salgath Trod's voice, of course—

"I'll take care of the Home Time Line end of it; as soon as we get you an impersonator, you go to work with him. Now, let's see whom we can depend on to help us with this. Lovranth Rolk, of course; Home Time Line section of the Paratime Code Enforcement Division. And—"

Verkan Vall and Dalla and Tortha Karf and four or five others looked across the desk and to the end of the room as the telecast screen broke into a shifting light-pattern and then cleared. The face of the announcer appeared; a young woman.

"And now, we bring you the statement which Chief Tortha, of the Paratime Police, has promised for this time. This portion of the program was audio-visually recorded at Paratime Police Headquarters earlier this evening."

Tortha Karf's face appeared on the screen. His voice began an announcement of how Executive Councilman Salgath Trod had called him by visiphone, admitting to complicity in the recently-discovered paratemporal slave-trade.

"Here is a recording of Councilman Salgath's call to me from his apartment to my office, at 1945 this evening."

The screen-image shattered into light-shards and rebuilt itself; Salgath Trod, at his desk in the library of his apartment, the brandy-goblet and the needler within reach, appeared. He began to speak; from time to time the voice of Tortha Karf interrupted, questioning or prompting him.

"You understand that this confession renders you liable to psycho-rehabilitation?" Tortha Karf asked.

Yes, Councilman Salgath understood that.

"And you agree to come voluntarily to Paratime Police Headquarters, and you will voluntarily undergo narco-hypnotic interrogation?"

Yes, Salgath Trod agreed to that.

"I am now terminating the playback of Councilman Salgath's call to me," Tortha Karf said, re-appearing on the screen. "At this point Councilman Salgath began making a state-

ment about his criminal activities, which we have on record. Because he named a number of his criminal associates, whom we have no intention of warning, this portion of Councilman Salgath's call cannot at this time be made public. We have no intention of having any of these suspects escape, or of giving their associates an opportunity to murder them to prevent their furnishing us with additional information. Incidentally, there was an attempt, made on the landing stage of Paratime Police Headquarters, to murder Councilman Salgath, when he was brought here guarded by Paratime Police officers—"

He went on to give a colorful and, as far as possible, truthful, account of the attack by the two pseudo-policemen and their pseudo-prisoner. As he told it, however, all three had been killed before they could accomplish their purpose, one of them by Salgath Trod himself.

The image of Tortha Karf was replaced by a view of the three assassins lying on the landing stage. They all looked dead, even the one who wasn't; there was nothing to indicate that he was merely drugged. Then, one after another, their faces were shown in closeup, while Tortha Karf asked for close attention and memorization.

"We believe that these men were Fifth Level Proles; we think that they were under hypnotic influence or obeying posthypnotic commands when they made their suicidal attack. If any of you have ever seen any of

these men before, it is your duty to inform the Paratime Police."

That ended it. Tortha Karf pressed a button in front of him and the screen went dark. The spectators relaxed.

"Well! Nothing like being sincere with the public, is there?" Della commented. "I'll remember this the next time I tune in a Management public statement."

"In about five minutes," one of the bureau-chiefs, said, "all hell is going to break loose. "I think the whole thing is crazy!"

"I hope you have somebody who can give a convincing impersonation," Lovranth Rolk said.

"Yes. A field agent named Kostran Galth," Tortha Karf said. "We ran the personal description cards for the whole Force through the machine; Kostran checked to within one-twentieth of one per cent; he's on Police Terminal, now, coming by rocket from Ravvanan Equivalent. We ought to have the whole thing ready for telecast by 1730 tomorrow."

"He can't learn to imitate Salgath's voice convincingly in that time, with all the work the cosmeticians'll have to be doing on him," Dalla said.

"Make up a tape of Salgath's own voice, out of that pile of recordings we got at his apartment, and what we can get out of the news file," Vall said. "We have phoneticists who can split syllables and splice them together. Kostran will deliver his speech in dumb-show, and we'll dub



the sound in and telecast them as one. I've messaged PolTerm to get to work on that; they can start as soon as we have the speech written."

"The more it succeeds now, the worse the blow-up will be when we finally have to admit that Salgath was killed here tonight," the Chief Inter-officer Coördinator, Zostha Olv said. "We'd better have something to show the public to justify that."

"Yes, we had," Tortha Karf agreed. "Vall, how about the Kholghoor Sector operation. How far's Ranthal Jard gotten toward locating one of those Wizard Trader time lines?"

"Not very far," Vall admitted. "He has it pinned down to the sub-sector, but the belt seems to be one

we haven't any information at all for. Never been any legitimate penetration by paratimers. He has his own hagiologists, and a couple borrowed from Outtime Religious Institute; they've gotten everything the slaves can give them on that. About the only thing to do is start random observation with boomerang-balls."

"Over about a hundred thousand time lines," Zostha Olv scoffed. He was an old man, even for his long-lived race; he had a thin nose and a narrow, bitter, mouth. "And what will he look for?"

"Croutha with guns," Tortha Karf told him, then turned to Vall. "Can't he narrow it more than that? What have his experts been getting out of those slaves?"

"That I don't know, to date." Vall looked at the clock. "I'll find out, though; I'll transpose to Police Terminal and call him up. And Skordan Kirv. No. Vulthor Tharn; it'd hurt the old fellow's feelings if I by-passed him and went to one of his subordinates. Half an hour each way, and at most another hour talking to Ranthar and Vulthor; there won't be anything doing here for two hours." He rose. "See you when I get back."

Dalla had turned on the telescreen again; after tuning out a dance orchestra and a comedy show, she got the image of an angry-faced man in evening clothes.

". . . And I'm going to demand a full investigation, as soon as Council convenes tomorrow morning!" he was shouting. "This whole story is a preposterous insult to the integrity of the entire Executive Council, your elected representatives, and it shows the criminal lengths to which this would-be dictator, Tortha Karf, and his jackal Verkan Vall will go—"

"So long, jackal," Dalla called to him as he went out.

He spent the half-hour transposition to Police Terminal sleeping. Paratime-transpositions and rocket-flights seemed to be his only chance to get any sleep. He was still sleepy when he sat down in front of the radio telescreen behind his duplicate of Tortha Karf's desk and put through a call to Nharkan Equivalent. It was 0600 in India; the Sector Regional Deputy Subchief who was

holding down Ranthar Jard's desk looked equally sleepy; he had a mug of coffee in front of him, and a brown-paper cigarette in his mouth.

"Oh, hello, Assistant Verkan. Want me to call Subchief Ranthar?"

"Is he sleeping? Then for mercy's sake don't. What's the present status of the investigation?"

"Well, we were dropping boomerang balls yesterday, while we had sun to mask the return-flashes. Nothing. The Croutha have taken the city of Sohram, just below the big bend of the river. Tomorrow, when we have sunlight, we're going to start boomerang-balling the central square. We may get something."

"The Wizard Traders'll be moving in near there, about now," Vall said. "The Croutha ought to have plenty of merchandise for them. Have you gotten anything more done on narrowing down the possible area?"

The deputy bit back a yawn and reached for his coffee mug.

"The experts have just about pumped these slaves empty," he said. "The local religion is a mess. Seems to have started out as a Great Mother cult; then it picked up a lot of gods borrowed from other peoples; then it turned into a dualistic monotheism; then it picked up a lot of minor gods and devils—new devils usually gods of the older pantheon. And we got a lot of gossip about the feudal wars and faction-fights among the nobility, and so on, all garbled, because these people are peasants who only knew what went on on the estate of their own lord."

"What did go on there?" Vall asked. "Ask them about recent improvements, new buildings, new fields cleared, new paddies flooded, that sort of thing. And pick out a few of the highest IQ's from both time lines, and have them locate this estate on a large-scale map, and draw plans showing the location of buildings, fields and other visible features. If you have to, teach them mapping and sketching by hypno-mech. And then drop about five hundred to a thousand boomerang balls, at regular intervals, over the whole paratemporal area. When you locate a time line that gives you a picture to correspond to their description, boomerang the main square in Sohram over the whole belt around it, to find Croutha with firearms."

The deputy looked at him for a moment, then gulped more coffee.

"Can do, Assistant Verkan. I think I'll send somebody to wake up Subchief Ranthal, right now. Want to talk to him."

"Won't be necessary. You're recording this call, of course? Then play it back to him. And get cracking with the slaves; you want enough information out of them to enable you to start boomerang balling as soon as the sun's high enough."

He broke off the connection and sent out for coffee for himself. Then he put through a call to Novilan Equivalent, in western North America.

It was 1530, there, when he got Vulthor Tharn on the screen.

"Good afternoon, Assistant Verkan. I suppose you're calling about the slave business. I've turned the entire matter over to Field Agent Skordran; gave him a temporary rank of Deputy Subchief. That's subject to your approval and Chief Tortha's, of course—"

"Make the appointment permanent," Vall said. "I'll have a confirmation along from Chief Tortha directly. And let me talk to him, now, if you please, Subchief Vulthor."

"Yes, sir. Switching you over now." The screen went into a beautiful burst of abstract-art, and cleared, after a while, with Skordran Kirv looking out of it.

"Hello, Deputy Skordran, and congratulations. What's come up since we had Nebu-hin-Abenoz cut out from under us?"

"We went in on that time line, that same night, with an airboat and made a recon in the hills back of Careba. Scared the fear of Safar into a party of Caleras while we were working at low altitude, by the way. We found the conveyer-head site; hundred-foot circle with all the grass and loose dirt transposed off it, and a pole pen, very unsanitary, where about two-three hundred slaves would be kept at a time. No indications of use in the last ten days. We did some pretty thorough boomeranging on that spatial equivalent over a couple of thousand time lines and found thirty more of them. I believe the slavers have closed out the whole

Esaron Sector operation, at least temporarily."

That was what he'd been afraid of; he hoped they wouldn't do the same thing on the Kholghoor Sector.

"Let me have the designations of the time lines on which you found conveyer heads," he said.

"Just a moment, Chief's Assistant; I'll photoprint them to you. Set for reception?"

Vall opened a slide under the screen and saw that the photoprint film was in place, then closed it again, nodding. Skordran Kirv fed a sheet of paper into his screen cabinet and his arm moved forward out of the picture.

"On, sir," he said. He and Vall counted ten seconds together, and then Skordran Kirv said: "Through to you." Vall pressed a lever under his screen, and a rectangle of microcopy print popped out.

"That's about all I have, sir. Want me to keep my troops ready here, or shall I send them somewhere else?"

"Keep them ready, Kirv," Vall told him. "You may need them before long. Call you later."

He put the microcopy in an enlarger, and carried the enlarged print with him to the conveyer room. There was something odd about the list of time line designations. They were expressed numerically, in First Level notation; extremely short groups of symbols capable of exact expression of almost inconceivably enormous numbers. Vall had only a general-education smattering of mathematics—enough to qualify him

for the chair of Higher Mathematics at any university on, say, the Fourth Level Europo-American Sector—and he could not identify the peculiarity, but he could recognize that there existed some sort of pattern. Shoving in the starting lever, he relaxed in one of the chairs, waiting for the transposition field to build up around him, and fell asleep before the mesh dome of the conveyer had vanished. He woke, the list of time line designations in his hand, when the conveyor rematerialized on Home Time Line. Putting it in his pocket, he hurried to an antigrav shaft and floated up to the floor on which Tortha Karf's office was.

Tortha Karf was asleep in his chair; Dalla was eating a dinner that had been brought in to her—something better than the sandwich and mug of coffee Vall had mentioned to Thalvan Dras. Several of the bureau chiefs who had been there when he had gone out had left, and the psychiatrist who had taken charge of the prisoner was there.

"I think he's coming out of the drug, now," he reported. "Still asleep, though. We want him to waken naturally before we start on him. They'll call me as soon as he shows signs of stirring."

"The Opposition's claiming, now, that we drugged and hypnotized Salgath into making that visiscreen confession," Dalla said. "Can you think of any way you could do that without making the subject incapable of lying?"

"Pseudo-memories," the psychiatrist said. "It would take about three times as long as the time between Salgath Trod's departure from his apartment and the time of the telecast, though—"

"You know much higher math?" Vall asked the psychiatrist.

"Well, enough to handle my job. Neuron-synapse inter-relations, memory-and-association patterns, that kind of thing, all have to be expressed mathematically."

Vall nodded and handed him the time-line designation list.

"See any kind of a pattern there?" he asked.

The psychiatrist looked at the paper and blanched his face as he drew on hypnotically-acquired information.

"Yes. I'd say that all the numbers are related in some kind of a series to some other number. Simplified down to kindergarten level, say the difference between A and B is, maybe, one-decillionth of the difference between X and A, and the difference between B and C is one-decillionth of the difference between X and B, and so on—"

A voice came out of one of the communication boxes:

"Dr. Nentrov; the patient's out of the drug, and he's beginning to stir about."

"That's it," the psychiatrist said. "I have to run." He handed the sheet back to Vall, took a last drink from his coffee cup, and bolted out of the room.

Dalla picked up the sheet of

paper and looked at it. Vall told her what it was.

"If those time lines are in regular series, they relate to the base line of operations," she said. "Maybe you can have that worked out. I can see how it would be; a stated interval between the Esaron Sector lines, to simplify transposition control settings."

"That was what I was thinking. It's not quite as simple as Dr. Nentrov expressed it, but that could be the general idea. We might be able to work out the location of the base line from that. There seems to be a break in the number sequence in here; that would be the time line Skordran Kirv found those slaves on." He reached for the pipe he had left on the desk when he had gone to Police Terminal and began filling it.

A little later, a buzzer sounded and a light came on on one of the communication boxes. He flipped the switch and said, "Verkan Vall here." Sothran Barth's voice came out of the box.

"They've just brought in Salgath Trod's servants. Picked them up as they came out of the house conveyer at the apartment building. I don't believe they know what's happened."

Vall flipped a switch and twiddled a dial; a viewscreen lit up, showing the landing stage. The police car had just landed; one detective had gotten out, and was helping the girl, Zinganna, who had been Salgath Trod's housekeeper and mistress, to descend. She was really beautiful, Vall

thought; rather tall, slender, with dark eyes and a creamy light-brown skin. She wore a black cloak, and, under it, a black and silver evening gown. A single jewel twinkled in her black hair. She could have very easily passed for a woman of his own race.

The housemaid and the butler were a couple of entirely different articles. Both were about four or five generations from Fourth Level Primitive savagery. The maid, in garishly cheap finery, was big-boned and heavy-bodied, with red-brown hair; she looked like a member of one of the northern European reindeer-herding peoples who had barely managed to progress as far as the bow and arrow. The butler was probably a mixture of half a dozen primitive races; he was wearing one of his late master's evening suits, a bright mellow-pink, which was distinctly unflattering to his complexion.

The sound-pickup was too far away to give him what they were saying, but the butler and maid were waving their arms and protesting vehemently. One of the detectives took the woman by the arm; she jerked it loose and aimed a backhand slap at him. He blocked it on his forearm. Immediately, the girl in black turned and said something to her, and she subsided. Vall said, into the box:

"Barth, have the girl in the black cloak brought down to Number Four Interview Room. Put the other two in separate detention cubicles; we'll talk to them later." He broke the connection and got to his feet. "Come

on, Dalla. I want you to help me with the girl."

"Just try and stop me," Dalla told him. "Any interviews you have with that little item, I want to sit in on."

The Proletarian girl, still guarded by a detective, had already been placed in the interview room. The detective nodded to Vall, tried to suppress a grin when he saw Dalla behind him, and went out. Vall saw his wife and the prisoner seated, and produced his cigarette case, handing it around.

"You're Zinganna; you're of the household of Councilman Salgath Trod, aren't you?" he asked.

"Housekeeper and hostess," the girl replied. "I am also his mistress."

Vall nodded, smiling. "Which confirms my long-standing respect for Councilman Salgath's exquisite taste."

"Why, thank you," she said. "But I doubt if I was brought here to receive compliments. Or was I?"

"No, I'm afraid not. Have you heard the newscasts of the past few hours concerning Councilman Salgath?"

She straightened in her seat, looking at him seriously.

"No. I and Nindrandigro and Calilla spent the evening on ServSec One-Six-Five. Councilman Salgath told me that he had some business and wanted them out of the apartment, and wanted me to keep an eye on them. We didn't hear any news at all." She hesitated. "Has anything . . . serious . . . happened?"

Vall studied her for a moment,

then glanced at Dalla. There existed between himself and his wife a sort of vague, semitelepathic, rapport; they had never been able to transmit definite and exact thoughts, but they could clearly prehend one another's feelings and emotions. He was conscious, now, of Dalla's sympathy for the Proletarian girl.

"Zinganna, I'm going to tell you something that is being kept from the public," he said. "By doing so, I will make it necessary for us to detain you, at least for a few days. I hope you will forgive me, but I think you would forgive me less if I didn't tell you."

"Something's happened to him," she said, her eyes widening and her body tensing.

"Yes, Zinganna. At about 2010, this evening," he said, "Councilman Salgath was murdered."

"Oh!" She leaned back in the chair, closing her eyes. "He's dead?" Then, again, statement instead of question: "He's dead!"

For a long moment, she lay back in the chair, as though trying to reorient her mind to the fact of Salgath Trod's death, while Vall and Dalla sat watching her. Then she stirred, opened her eyes, looked at the cigarette in her fingers as though she had never seen it before, and leaned forward to stuff it into an ash receiver.

"Who did it?" she asked, the Stone Age savage who had been her ancestor not ten generations ago peeping out of her eyes.

"The men who actually used the

needlers are dead," Vall told her. "I killed a couple of them myself. We still have to find the men who planned it. I'd hoped you'd want to help us do that, Zinganna."

He side-glanced to Dalla again; she nodded. The relationship between Zinganna and Salgath Trod hadn't been purely business with her; there had been some real affection. He told her what had happened, and when he reached the point at which Salgath Trod had called Tortha Karf to confess complicity in the slave trade, her lips tightened and she nodded.

"I was afraid it was something like that," she said. "For the last few days, well, ever since the news about the slave trade got out, he's been worried about something. I've always thought somebody had some kind of a hold over him. Different times in the past, he's done things so far against his own political best interests that I've had to believe he was being forced into them. Well, this time they tried to force him too far. What then?"

Vall continued the story. "So we're keeping this hushed up, for a while. The way we're letting it out, Salgath Trod is still alive, on Police Terminal, talking under narco-hypnosis."

She smiled savagely. "And they'll get frightened, and frightened men do foolish things," she finished. She hadn't been a politician's mistress for nothing. "What can I do to help?"

"Tell us everything you can," he said. "Maybe we can be able to take

such actions as we would have taken if Salgath Trod had lived to talk to us."

"Yes, of course." She got another cigarette from the case Vall had laid on the table. "I think, though, that you'd better give me a narco-hypnosis. You want to be able to depend on what I'm going to tell you, and I want to be able to remember things exactly."

Vall nodded approvingly and turned to Dalla.

"Can you handle this, yourself?" he asked. "There's an audio-visual recorder on now; here's everything you need." He opened the drawers in the table to show her the narco-hypnotic equipment. "And the phone has a whisper mouthpiece; you can call out without worrying about your message getting into Zinganna's subconscious. Well, I'll see you when you're through; you bring Zinganna to Police Terminal; I'll probably be there."

He went out, closing the door behind him, and went down the hall, meeting the officer who had taken charge of the butler and housemaid.

"We're having trouble with them, sir," he said. "Hostile. Yelling about their rights, and demanding to see a representative of Proletarian Protective League."

Vall mentioned the Proletarian Protective League with unflattering vulgarity.

"If they don't coöperate, drag them out and inject them and question them anyhow," he said.

The detective-lieutenant looked worried. "We've been taking a pretty high hand with them as it is," he protested. "It's safer to kill a Citizen than bloody a Prole's nose; they have all sorts of laws to protect them."

"There are all sorts of laws to protect the Paratime Secret," Vall replied. "And I think there are one or two laws against murdering members of the Executive Council. In case P.P.L. makes any trouble, they aren't here; they have faithfully joined their beloved master in his refuge on PolTerm. But one or both of them work for the Organization."

"You're sure of that?"

"The Organization is too thorough not to have had a spy in Salgath's household. It wasn't Zinganna, because she's volunteered to talk to us under narco-hyp. So who does that leave?"

"Well, that's different; that makes them suspects." The lieutenant seemed relieved. "We'll pump that pair out right away."

When he got back to Tortha Karf's office, the Chief was awake, and doodling on his notepad with his multicolor pen. Vall looked at the pad and winced; the Chief was doodling bugs again—red ants with black legs, and blue-and-green beetles. Then he saw that the psychiatrist, Nentrov Dard, was drinking straight 150-proof palm-rum.

"Well, tell me the worst," he said.

"Our boy's memory-obliterated," Nentrov Dard said, draining his glass and filling it again. "And he's plas-

tered with pseudo-memories a foot thick. It'll be five or six ten-days before we can get all that stuff peeled off and get him unblocked. I put him to sleep and had him transposed to Police Terminal. I'm going there, myself, tomorrow morning, after I've had some sleep, and get to work on him. If you're hoping to get anything useful out of him in time to head off this Council crisis that's building up, just forget it."

"And that leaves us right back with our old friends, the Wizard Traders," Tortha Karf added. "And if they've decided to suspend activities on the Kholghoor Sector, too—" He began drawing a big blue and black spider in the middle of the pad.

Nentrov Dard crushed out his cigar, drank his rum, and got to his feet.

"Well, good night, Chief; Vall. If you decide to wake me up before 1000, send somebody you want to get rid of in a hurry." He walked around the deck and out the side door.

"I hope they don't," Vall said to Tortha Karf. "Really, though, I doubt if they do. This is their chance to pick up a lot of slaves cheaply; the Croutha are too busy to bother haggling. I'm going through to Pol-Term, now; when Dalla and Zinganna get through, tell them to join me there."

On Police Terminal, he found Kostran Galth, the agent who had been selected to impersonate Salgath Trod. After calling Zulthran Torv, the mathematician in charge of the

Computer Office and giving him the Esaron time-line designations and Nentrov Dard's ideas about them, he spent about an hour briefing Kostran Galth on the role he was to play. Finally, he undressed and went to bed on a couch in the rest room behind the office.

It was noon when he woke. After showering, shaving and dressing hastily, he went out to the desk for breakfast, which arrived while he was putting a call through to Ranthal Jard, at Nharkan Equivalent.

"Your idea paid off, Chief's Assistant," the Kholghoor SecReg Sub-chief told him. "The slaves gave us a lot of physical description data on the estate, and told us about new fields that had been cleared, and a dam this Lord Ghromdour was building to flood some new rice-paddies. We located a belt of about five parayears where these improvements had been made; we started boomering the whole belt, time line by time line. So far, we have ten or fifteen pictures of the main square at Sohram showing Croutha with firearms, and pictures of Wizard Trader camps and conveyer heads on the same time lines. Here, let me show you; this is from an airboat over the forest outside the equivalent of Sohram."

There was no jungle visible when the view changed; nothing but clusters of steel towers and platforms and buildings that marked conveyer heads, and a large rectangle of red-and-white antigrav-buoys moored to warn air traffic out of the area being boom-

eranged. The pickup seemed to be pointed downward from the bow of an airboat circling at about ten thousand feet.

"Balls ready to go," a voice called, and then repeated a string of time-line designations. "Estimated return, 1820, give or take four minutes."

"Varth," Ranthal Jard said, evidently out of the boat's radio. "Your telecast is being beamed on Dhergabar Equivalent; Chief's Assistant Verkan is watching. When do you estimate your next return?"

"Any moment, now, sir; we're holding this drop till they rematerialize."

Vall watched unblinkingly, his fork poised halfway to his mouth. Suddenly, about a thousand feet below the eye of the pickup, there was a series of blue flashes, and, an instant later, a blossoming of red-and-white parachutes, ejected from the photo-reconnaissance balls that had returned from the Kholghoor Sector.

"All right; drop away," the boat captain called. There was a gush, from underneath, of eight-inch spheres, their conductor-mesh twinkling golden-bright in the sunlight. They dropped in a tight cluster for a thousand or so feet and then flashed and vanished. From the ground, six or eight aircars rose to meet the descending parachutes and catch them.

The screen went cubist for a moment, and then Ranthal Jard's swarthy, wide-jawed face looked out of it again. He took his pipe from his mouth.

"We'll probably get a positive out of the batch you just saw coming in," he said. "We get one out of about every two drops."

"Message a list of the time-line designations you've gotten so far to Zulthran Torv, at Computer Office here," Vall said. "He's working on the Esaron Sector dope; we think a pattern can be established. I'll be seeing you in about five hours; I'm rocketing out of here as soon as I get a few more things cleared up here."

Zulthran Torv, normally cautious to the degree of pessimism, was jubilant when Vall called him.

"We have something, Vall," he said. "It is, roughly, what Dr. Nentrov suggested—each of the intervals between the designations is a very minute but very exact fraction of the difference between lesser designation and the base-line designation."

"You have the base-line designation?" Vall demanded.

"Oh, yes. That's what I was telling you. We worked that out from the designations you gave me." He recited it. "All the designations you gave me are—"

Vall wasn't listening to him. He frowned in puzzlement.

"That's not a Fifth Level designation," he said. "That's First Level!"

"That's correct. First Level Abzar Sector."

"Now why in blazes didn't anybody think of that before?" he marveled, and as he did, he knew the answer. Nobody ever thought of the Abzar sector.

Twelve millennia ago, the world

of the First Level had been exhausted; having used up the resources of their home planet, Mars, a hundred thousand years before, the descendants of the population that had migrated across space had repeated on the third planet the devastation of the fourth. The ancestors of Verkan Vall's people had discovered the principle of paratime transposition and had begun to exploit an infinity of worlds on other lines of probability. The people of the First Level Dwarma Sector, reduced by sheer starvation to a tiny handful, had abandoned their cities and renounced their technologies and created for themselves a farm-and-village culture without progress or change or curiosity or struggle or ambition, and a way of life in which every day was like every other day that had been or that would come.

The Abzar people had done

neither. They had wasted their resources to the last, fighting bitterly over the ultimate crumbs, with fission bombs, and with muskets, and with swords, and with spears and clubs, and finally they had died out, leaving a planet of almost uniform desert dotted with vast empty cities which even twelve thousand years had hardly begun to obliterate.

So nobody on the Paratime Sector went to the Abzar Sector. There was nothing there—except a hiding-place.

"Well, message that to Subchief Ranthal Jard, Kholghoor Sector-at Nharkan Equivalent, and to Subchief Vulthor, Esaron Sector, Novilan Equivalent," Vall said. "And be sure to mark what you send Vulthor, 'Immediate attention Deputy Subchief Skordran.' "



That reminded him of something; as soon as he was through with Zulthran, he got out an order in the name of Tortha Karf authorizing Skordran Kirv's promotion on a permanent basis and messaged it out. Something was going to have to be done with Vulthor Tharn, too. A promotion of course—say Deputy Bureau Chief. Hypno-Mech Tape Library at Dhergabar Home Time Line; there Vulthor's passion for procedure and his caution would be assets instead of liabilities. He called Vlasthor Arph, the Chief's Deputy assigned to him as adjutant.

"I want more troops from ServSec and IndSec," he said. "Go over the TO's and see what can be spared from where; don't strip any time line, but get a force of the order of about three divisions. And locate all the big antigrav-equipped ship transposition docks on Commercial and Passenger Sectors, and a list of freighters and passenger ships that can be commandeered in a hurry. We think we've spotted the time line the Organization's using as a base. As soon as we raid a couple of places near Nharkan and Novilan Equivalents, we're going to move in for a planet-wide cleanup."

"I get it, Chief's Assistant. I do everything I can to get ready for a big move, without letting anything leak out. After you strike the first blow, there won't be any security problem, and the lid will be off. In the meantime, I make up a general plan, and alert all our own people. Right?"

"Right. And for your information, the base isn't Fifth Level; it's First Level Abzar." He gave the designation.

Vlasthor Arph chuckled. "Well, think of that! I'd even forgotten there was an Abzar Sector. Shall I tell the reporters that?"

"Fangs of Fasif, no!" Vall fairly howled. Then, curiously: "What reporters? How'd they get onto Pol-Term?"

"About fifty or sixty news-service people Chief Tortha sent down here, this morning, with orders to prevent them from filing any stories from here but to let them cover the raids, when they come off. We were instructed to furnish them weapons and audio-visual equipment and vocowriters and anything else they needed, and—"

Vall grinned. "That was one I'd never thought of," he admitted. "The old fox is still the old fox. No, tell them nothing; we'll just take them along and show them. Oh, and where are Dr. Hadron Dalla and that girl of Salgath Trod's?"

"They're sleeping, now. Rest Room Eighteen."

Dalla and Zinganna were asleep on a big mound of silk cushions in one corner, their glossy black heads close together and Zinganna's brown arm around Dalla's white shoulder. Their faces were calmly beautiful in repose, and they smiled slightly, as though they were wandering through a happy dream. For a little while, Vall stood looking at them, then he

began whistling softly. On the third or fourth bar, Dalla woke and sat up, waking Zinganna, and blinked at him perplexedly.

"What time is it?" she asked.

"About 1245," he told her.

"Ohhh! We just got to sleep," she said. "We're both bushed!"

"You had a hard time. Feel all right after your narco-hyp, Zinganna?"

"It wasn't so bad, and I had a nice sleep. And Dalla . . . Dr. Hadron, I mean—"

"Dalla," Vall's wife corrected. "Remember what I told you?"

"Dalla, then," Zinganna smiled. "Dalla gave me some hypno-treatment, too. I don't feel so badly about Trod, any more."

"Well, look, Zinganna. We're going to have a man impersonate Councilman Salgath on a telecast. The cosmeticians are making him over now. Would you find it too painful to meet him, and talk to him?"

"No, I wouldn't mind. I can criticize the impersonation; remember, I knew Trod very well. You know, I was his hostess, too. I met many of the people with whom he was associated, and they know me. Would things look more convincing if I appeared on the telecast with your man?"

"It certainly would; it would be a great help!" he told her enthusiastically. "Maybe you girls ought to get up, now. The telecast isn't till 1930, but there's a lot to be done getting ready."

Dalla yawned. "What I get, trying

to be a cop," she said, then caught the other girl's hands and rose, pulling her up. "Come on, Zinna; we have to get to work!"

Vall rose from behind the reading-screen in Ranthal Jard's office, stretching his arms over his head. For almost an hour, he had sat there pushing buttons and twiddling selector and magnification-adjustment knobs, looking at the pictures the Kholghoor-Nharkan cops had taken with auto-return balls dropped over the spatial equivalent of Sohram. One set of pictures, taken at two thousand feet, showed the central square of the city. The effects of the Croutha sack were plainly visible; so were the captives herded together under guard like cattle. By increasing magnification, he looked at groups of the barbarian conquerors, big men with blond or reddish-brown hair, in loose shirts and baggy trousers and rough cowhide buskins. Many of them wore bowl-shaped helmets, some had shirts of ring-mail, all of them carried long straight swords with cross-hilts, and about half of them had pistols thrust through their belts or muskets slung from their shoulders.

The other set of pictures showed the Wizard Trader camps and conveyer heads. In each case, a wide oval had been burned out in the jungle, probably with heavy-duty heat guns. The camps were surrounded with stout wire-mesh fence; in each there were a number of metal prefab-huts, and an inner fenced slave-pen. A trail had been cut from each to a

similarly cleared circle farther back in the forest, and in the centers of one or two of these circles he saw the actual conveyer domes. There was a great deal of activity in all of them, and he screwed the magnification-adjustment to the limit to scrutinize each human figure in turn. A few of the men, he was sure, were First Level Citizens; more were either Proles or outtimers. Quite a few of them were of a dark, heavy-featured, black-bearded type.

"Some of these fellows look like Second Level Khiftans," he said. "Rush an individual picture of each one, maximum magnification consistent with clarity, to Dhergarb Equivalent to be transposed to Home Time Line. You get all the dope from Zulthran Torv?"

"Yes; Abzar Sector," Ranthal Jard said. "I'd never have thought of that. Wonder why they used that series system, though. I'd have tried to spot my operations as completely at random as possible."

"Only thing they could have done," Vall said. "When we get hold of one of their conveyers, we're going to find the control panel's just a mess of arbitrary symbols, and there'll be something like a computer-machine built into the control cabinet, to select the right time line whenever a dial's set or a button pushed, and the only way that could be done would be by establishing some kind of a numerical series. And we were trustingly expecting to locate their base from one of their conveyers! Why, if we give all those

people in the pictures narco-hyps, we won't learn the base-line designation; none of them will know it. They just go where the conveyers take them."

"Well, we're all set now," Ranthal Jard said. "I have a plan of attack worked out; subject to your approval, I'm ready to start implementing it now." He glanced at his watch. "The Salgath telecast is over, on Home Time Line, and in a little while, a transcript will be on this time line. Want to watch it here, sir?"

The telecast screen in the living room of Tortha Karf's town apartment was still on; in it, a girl with bright red hair danced slowly to soft music against a background of shifting color. The four men who sat in a semicircle facing it sipped their drinks and watched idly.

"Ought to be getting some sort of public reaction soon," Tortha Karf said, glancing at his watch.

"Well, I'll have to admit, it was done convincingly," Zostha Olv, the Chief Interoffice Coördinator, admitted grudgingly. "I'd have believed it, if I hadn't known the real facts."

"Shooting it against the background of those wide windows was smart," Lovranth Rolk said. "Every schoolchild would recognize that view of the rocketport as being on Police Terminal. And including that girl Zinganna; that was a real masterpiece!"

"I've met her, a few times," Elbraz Vark, the Political Liaison Assistant, said. "Isn't she lovely!"

"Good actress, too," Tortha Karf

said. "It's not easy to impersonate yourself."

"Well, Kostran Galth did a fine job of acting, too," Lovranth Rolk said. "That was done to perfection—the distinguished politician, supported by his loyal mistress, bravely facing the disgraceful end of his public career."

"You know, I believe I could get that girl a booking with one of the big theatrical companies. Now that Salgath's dead, she'll need somebody to look after her."

"What sharp, furry ears you have, Mr. Elbraz!" Zostha Olv grunted.

The music stopped as though cut off with a knife, and the slim girl with the red hair vanished in a shatter of many colors. When the screen cleared, one of the announcers was looking out of it.

"We interrupt the program for an important newscast of a sensational development in the Salgath affair," he said. "Your next speaker will be Yandar Yadd—"

"I thought you'd managed to get that blabbermouth transposed to Pol-Term," Zostha said.

"He wouldn't go," Tortha Karf replied. "Said it was just a trick to get him off Home Time Line during the Council crisis."

Yandar Yadd had appeared on the screen as the pickup swung about.

". . . Recording ostensibly made by Councilman Salgath on Police Terminal Time Line, and telecast on Home Time Line an hour ago. Well, I don't know who he was, but I now

have positive proof that he definitely was not Salgath Trod!"

"We're sunk!" Zostha Olv grunted. "He'd never make a statement like that unless he could prove it."

". . . Something suspicious about the whole thing, from the beginning," the newsman was saying. "So I checked. If you recall, the actor impersonating Salgath gestured rather freely with his hands, in imitation of a well-known mannerism of the real Salgath Trod; at one point, the ball of his right thumb was presented directly to the pickup. Here's a still of that scene."

He stepped aside, revealing a view-screen behind him; when he pressed a button, the screen lighted; on it was a stationary picture of Kostran Galth as Salgath Trod, his right hand raised in front of him.

"Now watch this. I'm going to step up the magnification, slowly, so that you can be sure there's no substitution. Camera a little closer, Trath!"

The screen in the background seemed to advance, until it filled the entire screen. Yandar Yadd was still talking, out of the picture; a metal-tipped pointer came into the picture, touching the right thumb, which grew larger and larger until it was the only thing visible.

"Now here," Yandar Yadd's voice continued. "Any of you who are familiar with the ancient science of dactyloscopy will recognize this thumb as having the ridge-pattern known as a 'twin loop.' Even with the high degree of magnification pos-

sible with the microgrid screen, we can't bring out the individual ridges, but the pattern is unmistakable. I ask you to memorize that image, while I show you another right thumb print, this time a certified photocopy of the thumb print of the real Salgath Trod." The magnification was reduced a little, a card was moved into the picture, and it was stepped up again. "See, this thumb print is of the type known as a 'tent-ed arch.' Observe the difference."

"That does it!" Zostha Olv cried. "Karf, for the first and last time, let me remind you that I opposed this lunacy from the beginning. Now, what are we going to do next?"

"I suggest that we get to Headquarters as soon as we can," Tortha Karf said. "If we wait too long, we may not be able to get in."

Yandar Yadd was back on the screen, denouncing Tortha Karf passionately. Tortha went over and snapped it off.

"I suggest we transpose to Pol-Term," Lovranth Rolk said. "It won't be so easy for them to serve a summons on us there."

"You can go to PolTerm if you want to," Tortha Karf retorted. "I'm going to stay here and fight back, and if they try to serve me with a summons, they'd better send a robot for a process server."

"Fight back!" Zostha Olv echoed. "You can't fight the Council and the whole Management! They'll tear you into inch bits!"

"I can hold them off till Vall's able to raid those Abzar Sector

bases," Tortha Karf said. He thought for a moment. "Maybe this is all for the best, after all. If it distracts the Organization's attention—"

"I wish we could have made a boomerang-ball reconnaissance," Ranthal Jard was saying, watching one of the viewscreens, in which a film, taken from an airboat transposed to an adjoining Abzar sector, time line, was being shown. The boat had circled over the Ganges, a mere trickle between wide, deeply cut banks, and was crossing a gullied plain, sparsely grown with thornbush. "The base ought to be about there, but we have no idea what sort of changes this gang has made."

"Well, we couldn't; we didn't dare take the chance of it being spotted. This has to be a complete surprise. It'll be about like the other place, the one the slaves described. There won't be any permanent buildings. This operation only started a few months ago, with the Croutha invasion; it may go on for four or five months, till the Croutha have all their surplus captives sold off. That country," he added, gesturing at the screen, "will be flooded out when the rains come. See how it's suffered from flood-erosion. There won't be a thing there that can't be knocked down and transposed out in a day or so."

"I wish you'd let me go along," Ranthal Jard worried.

"We can't do that, either," Vall said. "Somebody's got to be in charge here, and you know your own people

better than I do. Beside, this won't be the last operation like this. Next time, I'll have to stay on Police Terminal and command from a desk; I want first-hand experience with the outtime end of the job, and this is the only way I can get it."

He watched the four police-girls who were working at the big terrain board showing the area of the Police Terminal time line around them. They had covered the miniature buildings and platforms and towers with a fine mesh, at a scale-equivalent of fifty feet; each intersection marked the location of a three-foot conveyer ball, loaded with a sleep-gas bomb and rigged with an automatic detonator which would explode it and release the gas as soon as it rematerialized on the Abzar Sector. Higher, on stiff wires that raised them to what represented three thousand feet, were the disks that stood for ten hundred-foot conveyers; they would carry squads of Paratime Police in aircars and thirty-foot air boats. There was a ring of big two-hundred-foot conveyers a mile out; they would carry the armor and the air-borne infantry and the little two-man scooters of the air-cavalry, from the Service and Industrial Sectors. Directly over the spatial equivalent of the Kholghoor Sector Wizard Traders' conveyers was the single disk of Verkan Vall's command conveyer, at a represented five thousand feet, and in a half-mile circle around it were the five news service conveyers.

"Where's the ship-conveyer?" he asked.

"Actually, it's on antigrav about five miles north of here," one of the girls said. "Representationally, about where Subchief Ranthal's standing."

Another girl added a few more bits to the network that represented the sleep-gas bombs and stepped back, taking off her earphones.

"Everything's in place, now, Assistant Verkan," she told him.

"Good. I'm going aboard, now," he said. "You can have it, Jard."

He shook hands with Ranthal Jard, who moved to the switch which would activate all the conveyers simultaneously, and accepted the good wishes of the girls at the terrain board. Then he walked to the mesh-covered dome of the hundred-foot conveyer, with the five news service conveyers surrounding it in as regular a circle as the buildings and towers of the regular conveyer heads would permit. The members of his own detail, smoking and chatting outside, saw him and started moving inside; so did the news people. A public-address speaker began yelping, in a hundred voices all over the area, warning those who were going with the conveyers to get aboard. He went in through a door, between two aircars, and on to the central control-desks, going up to a visiscreen over which somebody had crayoned "Novilan EQ." It gave him a view, over the shoulder of a man in the uniform of a field agent third class, of the interior of a conveyer like his own.

"Hello, Assistant Verkan," a voice came out of the speaker under the

screen, as the man moved his lips. "Deputy Skordran! Here's Chief's Assistant Verkan, now!"

Skordran Kirv moved in front of the screen as the operator got up from his stool.

"Hello, Vall; we're all set to move out as soon as you give the word," he said. "We're all in position on antigrav."

"That's smart work. We've just finished our gas-bomb net," Vall said. "Going on antigrav now," he added, as he felt the dome lift. "I hope you won't be too disappointed if you draw a blank on your end."

"We realize that they've closed out the whole Esaron Sector," Skordran Kirv, eight thousand odd miles away, replied. "We're taking in a couple of ships; we're going to make a survey all up the coast. There are a lot of other sectors where slaves can be sold in this area."

In the outside viewscreen, tuned to a slowly rotating pickup on the top of a tower spatially equivalent with a room in a tall building on Second Level Triplanetary Empire Sector, he could see his own conveyer rising vertically, with the news conveyers following, and the troop conveyers, several miles away, coming into position. Finally, they were all placed; he reported the fact to Skordran Kirv and then picked up a hand-phone.

"Everybody ready for transposition?" he called. "On my count. Thirty seconds . . . Twenty seconds . . . Fifteen seconds . . . Five seconds . . . Four seconds . . . Three

seconds . . . Two seconds . . . One second, *out!*"

All the screens went gray. The inside of the dome passed into another space-time continuum, even into another kind of space-time. The transposition would take half an hour; that seemed to be the time needed to build up and collapse the transposition field, regardless of the paratemporal distance covered. The dome above and around them vanished; the bare, tower-forested, building-dotted world of Police Terminal vanished, too, into the uniform green of the uninhabited Fifth Level. A planet could take pretty good care of itself, he thought, if people would only leave it alone. Then he began to see the fields and villages of Fourth Level. Cities appeared and vanished, growing higher and vaster as they went across the more civilized Third Level. One was under air attack—there was almost never a paratemporal transposition which did not run through some scene of battle.

He unbuckled his belt and took off his boots and tunic; all around him, the others were doing the same. Sleep-gas didn't have to be breathed; it could enter the nervous system by any orifice or lesion, even a pore or a scratch. A spacesuit was the only protection. One of the detectives helped him on with his metal and plastic armor; before sealing his gauntlets, he reciprocated the assistance, then checked the needler and blaster and the long batonlike ultrasonic paralyzer on his belt and made sure that the radio and sound-phones

in his helmet were working. He hoped that the frantic efforts to gather several thousand spacesuits onto Police Terminal from the Industrial and Commercial and Interplanetary Sectors hadn't started rumors which had gotten to the ears of some of the Organization's ubiquitous agents.

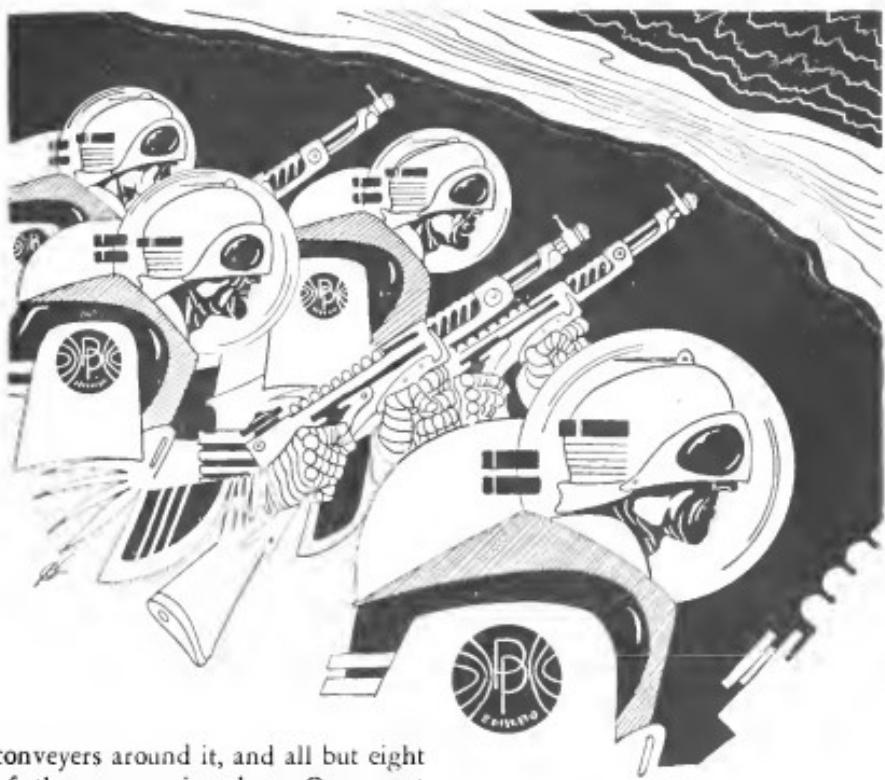
The country below was already turning to the parched browns and yellows of the Abzar Sector. There was not another of the conveyers in sight, but electronic and mechanical lag in the individual controls and even the distance-difference between them and the central radio control would have prevented them from going into transposition at the same fractional microsecond. The recon-details began piling into their cars. Then the red light overhead winked to green, and the dome flickered and solidified into cold, inert metal. The screens lighted up again, and Vall could see Skordran Kirv, across Asia and the Pacific, getting into his helmet. A dot of light in the center of the underview screen widened as the mesh under the conveyer irised open around the pickup.

Below, the Organization base—big rectangles of fenced slave pens, with metal barracks inside; the huge circle of the Kholghoor Sector conveyer-head building, and a smaller structure that must house conveyers to other Abzar Sector time lines; the workshops and living quarters and hangars and warehouses and docks—was wreathed in white-green mist. The

ring of conveyers at three thousand feet were opening and spewing out aircars and airboats, farther away, the greater ring of heavy conveyers were unloading armored and shielded combat-craft. An aircar which must have been above the reach of the gas was streaking away toward the west, with three police cars after it. As he watched, the air around it fairly sizzled blue with the rays of neutron disruption blasters, and then it blew apart. The three police cars turned and came back more slowly. The three-thousand-ton passenger ship which had been hastily fitted with armament was circling about; the great dock conveyer which had brought it was gone, transposed back to Police Terminal to pick up another ship.

He recorded a message announcing the arrival of the task-force, pulled out the tape and sealed it in a capsule, and put the capsule in a mesh message ball, attaching it to a couple of wires and flipping a switch. The ball flashed and vanished, leaving the wires cleanly sheared off. When it got back to Police Terminal, half an hour later, it would rematerialize, eject a parachute, and turn on a whistle to call attention to itself. Then he sealed on his helmet, climbed into an aircar, and turned on his helmet-radio to speak to the driver. The car lifted a few inches, floated out an open port, and dived downward.

He landed at the big conveyer-head building. There were spaces for fifty



conveyers around it, and all but eight of them were in place. One must have arrived since the gas bombs burst; it was crammed with senseless Kharanda slaves. A couple of Paratime Police officers were towing a tank of sleep-gas around on an anti-grav-lifter, maintaining the proper concentration in case any more came in. At the smaller conveyer building, there were no conveyers, only a number of red-lined fifty-foot circles around a central two-hundred-foot circle. The Organization personnel there had been dragged outside, and a group of paracops were sealing it up, installing robot watchmen, and preparing to flood it with gas. At the slave pens, a string of two-hundred-

foot conveyers, having unloaded soldiers and fighting-gear, were coming in to take on unconscious slaves for transposition to Police Terminal. Air-cars and airboats were bringing in gassed slaves; they were being shackled and dumped into the slave barracks; as soon as the gas cleared and they could be brought back to consciousness, they would be narco-hypnotized and questioned.

He had finished a tour of the warehouses, looking at the kegs of gunpowder and the casks of brandy, the piles of pig lead, the stacks of cases containing muskets. These must have all come from some low-order

handcraft time line. Then there were swords and hatchets and knives that had been made on Industrial Sector—the Organization must be getting them through some legitimate trading company—and mirrors and perfumes and synthetic fiber textiles and cheap jewelry, of similar provenance. It looked as though this stuff had been brought in by ship from somewhere else on this time line; the warehouses were too far from the conveyers and right beside the ship dock—

There was a tremendous explosion somewhere. Vall and the men with him ran outside, looking about, the sound-phones of their helmets giving them no idea of the source of the sound. One of the policemen pointed, and Vall's eyes followed his arm. The ship that had been transposed in in the big conveyer was falling, blown in half; as he looked, both sections hit the ground several miles away. A strange ship, a freighter, was coming in fast, and as he watched, a blue spark winked from her bow as a heavy-duty blaster was activated. There was another explosion, overhead; they all ran for shelter as Vall's command-conveyer disintegrated into falling scrap-metal. At once, all the other conveyers which were on antigrav began flashing and vanishing. That was the right, the only, thing to do, he knew. But it was leaving him and his men isolated and under attack.

"So that was it," Dalgroth Sorn, the Paratime Commissioner for Se-

curity said, relieved, when Tortha Karf had finished.

"Yes, and I'll repeat it under narco-hyp, too," Tortha Karf added.

"Oh, don't talk that way, Karf," Dalgroth Sorn scolded. He was at least a century Tortha Karf's senior; he had the face of an elderly and sore-toothed lion. "You wanted to keep this prisoner under wraps till you could mind-pump him, and you wanted the Organization to think Salgath was alive and talking. I approve both. But—"

He gestured to the viewscreen across the room, tuned to a pickup back of the Speaker's chair in the Council Chamber. Tortha Karf turned a knob to bring the sound volume up.

"Well, I'm raising this point," a member from the Management seats in the center was saying, "because these earlier charges of illegal arrest and illegal detention are part and parcel with the charges growing out of the telecast last evening."

"Well, that telecast was a fake; that's been established," somebody on the left heckled.

"Councilman Salgath's confession on the evening of One-Six-Two Day wasn't a fake," the Management supporter, Nanthav Skov, retorted.

"Well, then why was it necessary to fake the second one?"

A light began winking on the big panel in front of the Speaker, Asthar Varn.

"I recognize Councilman Hasthor Flan," Asthar said.

"I believe I can construct a theory

that will explain that," Hasthor Flan said. "I suggest that when the Paratime Police were questioning Councilman Salgath under narco-hypnosis, he made statements incriminating either the Paratime Police as a whole or some member of the Paratime Police whom Tortha Karf had to protect—say somebody like Assistant Verkan. So they just killed him, and made up this impostor—"

Tortha Karf began, alphabetically, to blaspheme every god he had ever heard of. He had only gotten as far as a Fourth Level deity named Allah when a red light began flashing in front of Asthar Varn, and the voice of a page-robot, amplified, roared:

"Point of special urgency! Point of special urgency! It has been requested that the news telecast screen be activated at once, with playback to 1107. An important bulletin has just come in from Nagorabar, Home Time Line, on the Indian subcontinent—"

"You can stop swearing, now, Karf," Dalgroth Sorn grinned. "I think this is it."

Kostran Galth sat on the edge of the couch, with one arm around Zinganna's waist; on the other side of him, Hadron Dalla lay at full length, her elbows propped and her chin in her hands. The screen in front of them showed a fading sunset, although it was only a little past noon at Dhergabar Equivalent. A dark ship was coming slowly in against the red sky; in the center of a wire-fenced compound a hundred-

foot conveyer hung on antigrav twenty feet from the ground, and beyond, a long metal prefab-shed was spilling light from open doors and windows.

"That crowd that was just taken in won't be finished for a couple of hours," a voice was saying. "I don't know how much they'll be able to tell; the psychologists say they're all telling about the same stories. What those stories are, of course, I'm not able to repeat. After the trouble caused by a certain news commentator who shall be nameless—he's not connected with this news service, I'm happy to say—we're all leaning over backward to keep from breaking Paratime Police security."

"One thing; shortly after the arrival of the second ship from Police Terminal—and believe me, that ship came in just in the nick of time!—the dead Abzar city which the criminals were using as their main base for this time line, and from which they launched the air attack against us, was located, and now word has come in that it is entirely in the hands of the Paratime Police. Personally, I doubt if a great deal of information has been gotten from any prisoners taken there. The lengths to which this Organization went to keep their own people in ignorance is simply unbelievable."

A man appeared for a moment in the lighted doorway of the shed, then stepped outside.

"Look!" Dalla cried. "There's Vall!"

"There's Assistant Verkan, now,"

the commentator agreed. "Chief's Assistant, would you mind saying a few words, here? I know you're a busy man, sir, but you are also the public hero of Home Time Line, and everybody will be glad if you say something to them—"

Tortha Karf sealed the door of the apartment behind them, then activated one of the robot servants and sent it gliding out of the room for drinks. Verkan Vall took off his belt and holster and laid them aside, then dropped into a deep chair with a sigh of relief. Dalla advanced to the middle of the room and stood looking about in surprised delight.

"Didn't expect this, from the mess outside?" Vall asked. "You know, you really are on the paracops, now. Nobody off the Force knows about this hideout of the Chief's."

"You'd better find a place like this, too," Tortha Karf advised. "From now on, you'll have about as much privacy at that apartment in Turquoise Towers as you'd enjoy on the stage of Dhergarb Opera House."

"Just what is my new position?" Vall asked, hunting his cigarette case out of his tunic. "Duplicate Chief of Paratime Police?"

The robot came back with three tall glasses and a refrigerated decanter on its top. It stopped in front of Tortha Karf and slewed around on its treads; he filled a glass and sent it to the chair where Dalla had seated herself; when she got a drink, she

sent it to Vall. Vall sent it back to Tortha Karf, who turned it off.

"No; you have the modifier in the wrong place. You're Chief of Duplicate Paratime Police. You take the setup you have now, and expand it; continue the present lines of investigation, and be ready to exploit anything new that comes up. You won't bother with any of this routine flying-saucer-scare stuff; just handle the Organization business. That'll keep you busy for a long time, I'm afraid."

"I notice you slammed down on the first Council member who began shouting about how you'd wiped out the Great Paratemporal Crime-Ring," Vall said.

"Yes. It isn't wiped out, and it won't be wiped out for a long time. I shall be unspeakably delighted if, when I turn my job over to you, you have it wiped out. And even then, there'll be a loose end to pick up every now and then till you retire."

"We have Council and the Management with us, now," Vall said. "This was the first secret session of Executive Council in over two thousand years. And I thought I'd drop dead when they passed that motion to submit themselves to narco-hypnosis."

"A few Councilmen are going to drop dead before they can be narco-hypnotized," Dalla prophesied over the rim of her glass.

"A few have already. I have a list of about a dozen of them who have had fatal accidents or committed suicide, or just died or vanished since

the news of your raid broke. Four of them I saw, in the screen, jump up and run out as soon as the news came in, on One-Six-Five Day. And a lot of other people; our friend Yandar Yadd's dropped out of sight, for one. You heard what we got out of those servants of Salgath Trod's?"

"I didn't," Dalla said. "What?"

"Both spies for the Organization. They reported to a woman named Farilla, who ran a fortune-telling parlor in the Prole district. Her occult powers didn't warn her before we sent a squad of plain-clothes men for her. That was an entirely illegal arrest, by the way, but it netted us a list of about three hundred prominent political, business and social persons whose servants have been reporting to her. She thought she was working for a telecast gossipist."

"That's why we have a new butler, darling," Vall interrupted. "Kandagro was reporting on us."

"Who did she pass the reports on to?" Dalla asked.

Tortha Karf beamed. "She thinks more like a cop every time I talk to her," he told Vall. "You better appoint her your Special Assistant. Why, about 1800 every day, some Prole would come in, give the recognition sign, and get the day's accumulation. We only got one of them, a fourteen-year-old girl. We're having some trouble getting her deconditioned to a point where she can be hypnotized into talking; by the time we do, they'll have everything closed out, I suppose. What's the

latest from Abzar Sector? I missed the last report in the rush to get to this Council session."

"All stalled. We're still boom-cranging the sector, but it's about five billion time-lines deep, and the pattern for the Kholghoor and Esaron Sectors doesn't seem to apply. I think they have a lot of these Abzar time lines close together, and they get from one to another via some terminal on Fifth Level."

Tortha Karf nodded. It was impossible to make a transposition of less than ten parayears—a hundred thousand time lines. It was impossible that the field could build and collapse that soon.

"We also think that this Abzar time line was only used for the Croutha-Wizard Trader operation. Nothing we found there was more than a couple of months old; nothing since the last rainy season in India, for instance. Everything was cleaned out on Skordran Kirv's end."

"Tell him to try the Mississippi, Missouri and Ohio Valleys," Tortha Karf said. "A lot of those slaves are sure to have been sold to Second Level Khiftan Sector."

"Well, it looks as though our vacation's out the window for a long time," Dalla said resignedly.

"Why don't you and Vall go to my farm, on Fifth Level Sicily," Tortha Karf suggested. "I own the whole island, on that time line, and you can always be reached in a hurry if anything comes up."

"We could have as much fun there as on the Dwarma Sector,"

Dalla said. "Chief, could we take a couple of friends along?"

"Well, who?"

"Zinganna and Kostran Galth," she replied. "They've gotten interested in one another; they're talking about a tentative marriage."

"It'll have to be mighty tentative," Vall said. "Kostran Galth can't marry a Prole."

"She won't be a Prole very long. I'm going to adopt her as my sister."

Tortha Karf looked at her sharply. "You sure you know what you're doing, Dalla?" he asked.

"Of course I'm sure. I know that girl better than she knows herself. I narco-hopped her, remember. Zinna's the kind of a sister I've always wished I'd had."

"Well, that's all right then. But about this marriage. She was in love with Salgath Trod," Tortha Karf said. "Now, she's identifying Agent Kostran with him—"

"She was in love with the kind of man Salgath could have been if he hadn't gotten into this Organization filth," Dalla replied. "Galth is that kind of a man. They'll get along all right."

"Well, she'll qualify on IQ and

general psych rating for Citizenship, I'll say that. And she's the kind of girl I like to see my boys take up with. Like you, Dalla. Yes, of course; take them along with you. Sicily's big enough that two couples won't get in each others' way."

A phone-robot, its slender metal stem topped by a metal globe, slid into the room on its ball-rollers, moving falteringly, like a blind man. It could sense Tortha Karf's electroencephalic wave-patterns, but it was having trouble locating the source. They all sat motionless, waiting; finally it came over to Tortha Karf's chair and stopped. He unhooked the phone and held a lengthy whispered conversation with somebody before replacing it.

"Now, there," he explained to Dalla. "That's a sample of why we have to set up this duplicate organization. Revolution just broke out at Ftanna, on Third Level Tsorshay Sector; a lot of our people, mostly tourists and students, are cut off from their conveyers by street fighting. Going to be a pretty bloody business getting them out." He finished his drink and got to his feet. "Sit still; I just have to make a few screen-calls. Send the robot for something to eat, Vall. I'll be right back."

THE END





HOLD THAT HELIUM!

BY SYLVIA JACOBS

There's been a slight misunderstanding on the matter of helium-oxygen atmospheres. The author of this article doesn't know spaceships, perhaps—but she's "been there" when it comes to actually working in synthetic atmospheres, and knows the problems of breathing mixtures by experience!

For years, science-fiction writers have gone unchallenged, when they used oxy-helium as a breathing supply to prevent "space bends." Authoritative texts seriously suggest helium. Willy Ley states: "It becomes clear, then, that the atmosphere inside a spaceship cabin should be a helium-oxygen instead of a nitrogen-oxygen mixture."¹ It seems high time somebody subjected this idea to explosive decompression.

Otherwise, we may wake up some morning to newspaper accounts of a real satellite crew shivering in a 70°F. oxy-helium atmosphere, losing body heat at an abnormal rate. While speeding up heat exchange is not particularly comfortable in diving, it is harmless in submersions of three to five hours. But it has not been demonstrated that it would be harmless

to the system to keep this up for weeks at a stretch.

What *has* been demonstrated in thirty years of using oxy-helium for deep diving, the space crew would learn all over again, the hard way. For one thing they'd find helium would flow through a meteorite puncture faster than less active gases, and seep into space through defects in the satellite so minute that oxygen or air could not pass.² Even in the absence of a puncture, the helium percentage would gradually decrease in a cabin kept at sea-level pressure by removal of CO₂ and addition of oxygen. The crew would have to analyze the gas mixture—as is done with

¹You can test this yourself inexpensively. Buy a toy balloon inflated with helium. Inflate an identical balloon with air at a filling station. Let the helium balloon float to the ceiling when you go to bed. In the morning, the helium balloon will be collapsed and on the floor, while the air balloon will still be inflated if you fastened it snugly tightly.

²"Rockets, Missiles, and Space Travel."

stored flasks of oxy-helium before they are used by a diver—and restore lost helium, or else they would eventually be breathing almost pure oxygen, which is highly irritating to the lungs when breathed for prolonged periods at fifteen pounds.³ In an ill-advised effort to avoid "space bends" they would be inviting "space pneumonia."

But the most peculiar result of oxy-helium is that the spacemen would at first be unable to understand⁴ each other's speech! They might converse in sign language, or scribble notes to each other. Even if they learned eventually to adapt their voices to the oxy-helium atmosphere—as an experienced diver does to make himself more intelligible to the telephone tender—every sound and echo in the cabin would be weirdly distorted, adding to the unearthliness of the environment. And all because the space-planners, being aviation specialists, had rather foggy ideas about deep-sea diving, even as John Q. Public.

Divers use compressed air almost invariably at depths to one hundred and fifty feet—six atmospheres absolute pressure—or less. Beyond that depth, they use oxy-helium, if available, and have used it on down to six hundred feet—twenty-one at-

mospheres absolute—a depth⁵ never attained with compressed air. Therefore, it follows, according to Mr. Ley, that helium is "another and better substitute for nitrogen" in a spaceship cabin—one atmosphere pressure or less. Or is it? This question I propose to investigate.

In all due humility, I must first explain that I do not by any means profess to be an authority on space problems in general. I'll even admit that the high-altitude reasoning of such learned gentlemen as Heinz Haber, Colonel Paul C. Campbell, and Willy Ley, is sometimes over my head. But when these specialists draw analogies from diving theory and practice, when, for instance, they compare the orientation and propulsion methods of a weightless spaceman, with those of a diver at near-neutral buoyancy, they get beyond their depth. In fact, they come 'way, 'way down to my level!

The helium-for-spacecraft idea arises through a complete misunderstanding of the real reason deep divers use oxy-helium today. In advocating helium to prevent the much-publicized bends, science-fictioneers are living back in 1921, with a pre-

³Healthy men breathing ninety per cent pure oxygen at fifteen pounds per square inch (sea-level atmospheric pressure) for periods of more than seven hours, have come down with "wet lung" and a form of pneumonia.

⁴The United States Navy diving manual, helium section, remarks ruefully, "It is almost impossible to understand the diver."

⁵Descents in diving spheres are not comparable; the occupants are at one atmosphere pressure, like the space crew, regardless of depth. With the flexible inflated dress, breathing pressure is maintained at about two pounds per square inch more than the pressure of the surrounding water. (Why diving suits are called dresses nobody seems to know, but you can be pretty sure that a writer who calls them suits doesn't know much about diving, or else is tempering his trade jargon to public taste.)

conceived and since thoroughly disproved theory. But bends is by no means the only thing deep divers have to consider.

Nitrogen bubbles form in the body when external pressure is released in a certain ratio, in much the same way carbonation bubbles fizz in a bottle of pop when the cap is removed. Early researchers hoped a lighter⁶ inert gas might, among other things, reduce the possibilities of this. But thirty years of practical use have demonstrated that helium merely changes the ratio and the location of bubbles in the body. Certain tissues absorb more helium, other tissues, such as fat, absorb more nitrogen.

As the United States Navy diving manual puts it: "Contrary to previous expectations, the use of oxy-helium mixtures does not permit material (sic) reductions in decompression time, but does permit deeper diving and performance of work at such depths . . .".

The principal reason oxy-helium has proved of value in deep diving, is that it prevents the less-publicized befogging of the senses called nitrogen narcosis. Compressed air is very exhilarating at depths to about sixty or seventy-five feet, and there is considerable evidence that breathing it improves health. Divers sometimes refer to theirs as "the healthiest trade in the world," though you might never suspect it if your acquaintance-

ship among divers is limited to those in the pages of the hair-raising thrillers.

But at greater depths the tonic effect is superseded by a toxic effect. The tolerance varies greatly with individuals, but at one hundred feet, or four atmospheres absolute, even a natural-born diver notices a marked depression. One hundred and fifty feet is considered a practical working limit, and air is not used beyond one hundred and fifty feet if oxy-helium gear is available.

Well-adapted individuals sometimes work deeper than this with air, but beyond two hundred and twenty-five feet the combination of nitrogen narcosis, re-breathed carbon dioxide, and oxygen poisoning, affects the faculties to such an extent that the diver becomes highly inefficient if not totally useless, and also becomes an accident-prone. He acts like the more familiar kind of drunk.

Helium has been shown to be completely nontoxic in test dives to six hundred feet, the removal of carbon dioxide is better with the oxy-helium recirculating helmet, and the proportion of oxygen in the mixture can be reduced as the pressure increases. Actual salvage operations have been conducted at four hundred and fifty feet with the artificial breathing supply.

As for bubbles, the Navy says there is "no panacea." But there are three methods of minimizing the chances. They are, (1) Pick the right grandparents, and remember that "it takes a thousand dives to make a diver."

⁶In case any science-fiction writer decides to use hydrogen to dilute his oxygen supply, I might add here that it has been tried, and also causes bubbles if decompression is inadequate.

Heredity determines tolerance, experience teaches what your individual tolerance is. For your first one thousand dives, use, except in emergency, method (2) decompress by stages, following tables based on average tolerance. For your first one hundred dives, at least, use method (3) don't go deep enough to get bubbles on the way up.

The first method was discovered before the second, and is still in use in civilian diving. The ideal grandparents for a diver would be a pair of sea lions, which have auxiliary blood vessels to accommodate bubbles, but there are some very good human substitutes. The second method is to be invariably followed if you are in the Navy, or else you will be slapped promptly into a recompression⁷ chamber, whether you show any symptoms or not.⁸ The third method applies to recreational mask divers who don't have to go deep to make a living, and to spacemen.

A man who has done considerable diving at one hundred feet or more with compressed air, and then tries oxy-helium, is likely to say he didn't feel deep. This does not mean he

⁷This is not a typographical error. The tank is intended to recompress divers. A decompression chamber would be a tank to simulate high altitudes. The terms are often confused.

⁸The one exception being a very select few bends-resistant experimental subjects. The theory seems to be that the less said about the existence of these phenomenal men, the better for the welfare of Seaman First Class Average, who might try to imitate them with sad results. Nothing is said about them in Navy manuals, but we happen to know one who became a civilian diver after he got out of the Navy.

felt less pressure; humans don't have sensory receptors to inform them of evenly-distributed pressure—though air bladder fish do. It means his senses were alert, he could do more work per hour and stay down longer, though he wore electrically heated underwear to partially compensate for rapid heat-loss from his body.

Nitrogen narcosis, of course, constitutes no hazard whatsoever to a space crew breathing air at one atmosphere pressure or less, any more than it does to the reader of this article seated comfortably on Earth. Having considered the deep diver's reasons for using oxy-helium, let us proceed to Mr. Ley's reasons. He says,

"If a meteorite punctured the skin of a space station . . . the space-men might suffer an attack of "the bends," an often-fatal (sic) affliction caused by the fact that some of the nitrogen we breathe forms painful and dangerous bubbles in the blood when the pressure drops suddenly outside the body. Helium does not dissolve easily in the blood stream. The Navy has tested a helium-oxygen mixture in deep-sea diving with good results."⁹

Let's see what the Navy has to say about this. The next quotation is from the United States Navy diving manual, helium section:

"As helium is absorbed more rapidly than nitrogen, some tissues may take up more helium during a given

⁹Collier's magazine, March 22, 1952. All Ley quotations except this one are from "Rockets, Missiles, and Space Travel."

exposure to pressure. Helium will also leave the tissues faster. Both phases promote the formation of bubbles . . . Accordingly, it is desired to emphasize that a diver can contract bends when using oxy-helium mixtures as readily as with normal air and that decompression in accordance with the tables herein is essential."

The Navy's desire for emphasis, would suggest that Mr. Ley isn't the only one, that some Navy diving candidates may have a pre-conceived notion that you can't get bends with helium, which has to be emphatically corrected.

Elsewhere Mr. Ley concedes the existence of helium bubbles, but doesn't seem to think they are anything to worry about. He says, "Helium does dissolve in the body to a certain extent, but is much less soluble than nitrogen, roughly one-fifth.¹⁰ Conversely, the process of bubble-formation under decompression is much milder; in fact, only in extreme cases does it occur to a health-impairing extent."

The last clause is quite true, but it is equally true that only in extreme cases do nitrogen bubbles occur to a health-impairing extent. And as for nitrogen bubbles being an "often-fatal affliction"—Navy figures show a *six-tenths of one per cent fatality*

rate and a five per cent incidence. That is, to each fatality, there were one hundred and seventy-five cases of bends in thirty-five hundred ascents; or twenty deaths in seventy thousand ascents.

Five per cent incidence seems high—possibly because Navy divers are ordered to report even slight symptoms. The Navy man may have to go into the tank, while a marine products diver is recompressed in the course of his daily work, since he goes down every good weather day. If he has some discomfort during the night, he can count on its going away when he gets on the bottom again. One ex-Navy diver told me he spent more time on the bottom in his first two weeks as a marine products diver, than in seven years in the Navy.

These figures are not to be taken as meaning that every man who makes thirty-five hundred dives gets bends one hundred and seventy-five times. I know individuals who have made more dives than that, and say they don't know what bends feels like. I know one old-timer who has made well over twice that many ascents, has had bends three times—that is, three times he considered serious enough to mention—and is still diving at the age of seventy. When he started diving, at the age of eighteen, decompression tables had not yet been invented.

¹⁰I can find nothing even roughly corresponding to this figure in any available source-book on diving theory. The nearest thing is that fat takes up seven times as much nitrogen as lean tissue, and three times as much helium. Fat men make good skin divers but poor gear divers.

bles have a particularly fiendish habit of collecting in the pulmonary bed; colloquially an attack is called "the chokes" and medically it is termed "a severe asphyxia." The treatment is pure oxygen, under pressure. This hardly sounds as if an attack of helium bubbles would seem mild to a spaceman who simultaneously had his oxygen supply cut to half sea-level normal.

Nitrogen bubbles have been known to show up in so many different locations, that when a diver gets anything from indigestion to dandruff, he suspects he "has a bubble" and takes a "medicine dive." What's more, the compression seems to help in a wide variety of ailments, which may be due to the increased oxygen intake.

But the most likely locations for actual nitrogen bubbles are under the skin and in the joints. The latter place, of course, gave rise to the term "bends." The most frequent form is "skin bends"—a *reductio ad absurdum*. This may be quite mild; first symptoms are an itching sensation, which probably means that very tiny nitrogen bubbles are more or less uniformly distributed in the venous system, on their way back to the lungs, but can be felt only in the small capillaries under the skin. Sometimes they cause the eyes to be bloodshot; I have often noticed this in my husband's eyes after he had been doing deep work, though he showed no other symptoms.¹¹

The itching sensation is sometimes used by an expert civilian diver as

his own private decompression table; he hangs on the anchor chain until the itching stops, until the bubbles have been exhaled. If he went on up before it stopped, conceivably these small bubbles could congregate and expand further into bubbles large enough to produce more distressing symptoms. (I should add here that I am *not* recommending this practice for beginning divers, who should adhere to tables, which are based on average tolerance.)

There have naturally been fewer cases of helium bubbles, since air was used long before oxy-helium, and most Navy and commercial diving is still done with the less costly and far less complicated compressed air gear. But the helium work is deeper; there is a large ratio of reduction when an oxy-helium diver makes an emergency ascent from, say two hundred feet. Since air is used mostly at one hundred feet or less, the ratio of reduction is not so great in case of emergency ascent—for instance, if the air-compressor stops. Under these circumstances, it would be impossible, in diving practice, to find any clinical evidence for Mr. Ley's contention that helium bubble attacks are milder; I can only conclude this was an extrapolation from decompression table totals.

This brings us to the "tables here-

¹¹A man whose eyes have been chronically blood-shot most of his life, should not try deep diving. The eyes of a bends-resistant are clear, (unless he has recently taken a material pressure reduction) and his skin does not bruise easily. This indicates the walls of his blood vessels are elastic, not brittle.

in," where at last we shall discover some apparent documentary evidence to support the helium-for-spacecraft idea. Comparing the *total* oxy-helium decompression time, with the total decompression time for an air dive of the same depth and duration, we find that the diver with the artificial breathing supply requires somewhat less *total* decompression time.

If we jump to the conclusion that it was the helium content of the mixture that was responsible, ignoring the change in oxygen proportion during the ascent, ignoring also the permissible reduction ratio as shown by the depths of decompression stops in both tables, these totals can mislead us.

Mr. Ley seems to indicate that he based his case on these misleading totals, when he says, "Diving tests with rapid (sic) ascent have shown that . . . divers . . . emerging in a helium-oxygen atmosphere, can sustain decompressions that *would have killed them* if the atmosphere had been a nitrogen-oxygen mixture." (italics mine.)

Predicting that a diver would get killed in a certain ascent, is something like predicting that a pedestrian will get killed if he crosses a busy intersection against the light. It depends partly on how nimble the pedestrian is; all people are not alike. But the same pedestrian might cross the same intersection a hundred times and get killed on the hundred-and-first. This very thing happened to the first of all known bends-resistants, over a century ago, when full diving

gear was first invented. He shot up day after day from a one-hundred-foot depth, seeming immune to the mysterious ailment that struck down other divers who did the same thing; finally, on a day when he made two such ascents, he died.

Mr. Ley's entirely unjustified assumption that every air ascent that does not conform strictly to tables is automatically fatal, reminds me, for some reason, of my husband's habit of remarking, "Well, I got killed again today," by which he means that he would have been, if divers died as readily in actuality as they do in print. But aside from this, the chief inaccuracy in the above quotation is that the divers Mr. Ley is talking about, did not *emerge* in the helium-containing atmosphere they were breathing while on the bottom.

A precise comparison between air and oxy-helium tables is difficult; the O-H tables are more complicated, rate of ascent depending on percentage of oxygen in the mixture the diver was breathing while on the bottom. Optimum duration for deep air dives is less, due to the nitrogen narcosis factor. But the following deep-sea version of an Aesop's fable, will serve to illustrate the principles involved.

Once upon a time, there were two divers on the bottom at one hundred and seventy feet. One of them was Lieutenant O.H. Tortoise, U.S.N., who wore a fancy new oxy-helium re-circulating helmet, and the other was Mr. H-air, a civilian who wore

a much-dented old "pot" with a cracked face-plate, and had nothing to breathe but air, which is free.

Both divers have been on the bottom an hour, both signal "bring me up" simultaneously. Now we are going to have a race to the surface, in accordance with decompression tables.

Mr. H-air is leading in the first part of the race. He is brought straight up one hundred and twenty feet with no decompression stops enroute. Having left his rival well behind, Mr. H-air decides to take a decompression stop nap at the fifty-foot level, and continue napping at ten-foot intervals from there on up.

Lieutenant O.H. Tortoise gets a slow start. All his decompression stops are taken in the first one hundred and twenty feet of the race. But at the sixty-foot level, he gets his second wind, so to speak. He ventilates with twenty-five cubic feet of pure oxygen, to flush the helium out of his gear. Having stayed at the next stop long enough to get the helium handicap out of his body, also, he is brought to the surface with no further decompression stops, and, breathing pure oxygen, emerges from the water the winner.

His record for the course is just under two hours—not exactly what I would call a rapid ascent—and sleepy old Mr. H-air doesn't get out of the water until forty-five minutes later.

Thus we see that stage decompression is slowest with oxy-helium, intermediate with natural air, and

fastest with pure oxygen. The gain on the oxygen, slightly more than offsets the loss on the helium, there is some net saving in decompression time with the artificial breathing supply, but not what the Navy calls a "material" saving.

Mr. Ley was "warm" when he remarked in another connection, "bends might be avoidable if the body is saturated with oxygen for (five hours) before decompression occurs," but still managed to miss the point that the helium diver is shifted to pure oxygen as soon as he is shallow enough to tolerate it without undue risk of oxygen poisoning, and for this reason only he reaches the surface sooner than with air.

It would seem that we have pretty thoroughly flushed the helium out of our spaceship, as well as out of the helmet, and having nothing left for our spacemen to breathe but plain old air. Let us now investigate the possibilities of their getting "space bends" with this mundane breathing supply. To determine this, we will have to have some idea of the ratio of pressure-loss they will have to take. Mr. Ley supplies us with this information, or at least with a basis for conjecture.

He says, "Supposing that the air pressure drops to half its normal amount between the accident and the emergency repair . . . There would still be air enough left for breathing—uncomfortable breathing—but the rapid decompression might have serious consequences. The occupants might come down with a case of

diver's sickness, commonly called bends."

(He does not specify what "rapid" means here. But for the time being, let's suppose the drop from fifteen to seven and one-half pounds per square inch takes one minute, since he also says the air would not escape "instantaneously." Some mathematician may kindly provide a more exact time-table for pressure loss caused by meteorites of various magnitudes, with a cabin of given volume. This was too complicated for me, since the intakes would also presumably be operating; in fact, I kept wondering what was wrong with the regulators.)

By an ironic co-incidence, Mr. Ley has, in the above passage, hit the Haldane axiom right on the nose. Dr. Haldane, a British physician whose name will live long in the annals of diving, performed, in 1906, the original experiments on compressed air illness, and arrived at the axiom on which the first stage-decompression tables were based. Further research showed these figures to be on the conservative side, and present-day decompression time is somewhat less. Haldane later worked on the original oxy-helium experiments, and the gas analysis apparatus bears his name.

Mark the following quotation well. It summarizes, in a very small nutshell, the Haldane axiom, the further research, and the oxy-helium research. It tells us quite specifically what is the preferred atmosphere for our space crew.

The United States Navy diving

manual says: "While the ratio of the pressure of the gas within the diver's body to the external pressure can be 2.0 or 2.25 to 1 safely with nitrogen, this ratio is about 1.7 to 1 with helium."

So here we see that a crew taking the pressure-drop Mr. Ley specifies, could get the chokes if they were breathing oxy-helium, but would be extremely unlikely to get bends if they were breathing ordinary air!!! The only trouble with his bubble-prevention idea is that he has it backwards.

I say "extremely unlikely" instead of making a positive statement that they can't get nitrogen bubbles from a two to one drop, which might be made by a space-minded researcher who found these safety ratios, but didn't know many divers in person. Once in a blue moon, a freak susceptible shows up in diving, who can't take even the ratios that are safe for the majority of persons. Such a man wouldn't be suited to the economic pressures of civilian diving; a man can't support three families, his own and those of his crew, while hanging on an anchor chain or snoozing in a tank. In a rather wide acquaintance-ship among civilian divers, I have never actually known such an extreme susceptible. But one ex-Navy diver I know, swears that a shipmate of his¹² got bends several times after thirty-five-foot dives. The civilian divers hereabouts laugh somewhat skeptically when they hear this. But you never can tell about the human race—sometimes it even produces

Siamese twins. At any rate, the possibility of a fatal case of nitrogen bubbles from such a shallow ascent is so remote that for practical purposes it is disregarded in diving, and would be equally, or rather more remote, in the specified spaceship situation.

You will pardon me, I hope, for withholding these important safety ratios until now. In themselves, they are conclusive enough to cover. The discussion of deep diving was really irrelevant to the spaceship situation. People who view "space bends" with alarm, are confusing a loss-ratio so small as to be a joke to a real diver, with the relatively enormous 6, 7, or 8 to one loss-ratios that sometimes—but not invariably—cause serious

¹²However rigid the general physical fitness requirements for space crews, we could not be sure of not recruiting such a freak susceptible. Both extreme susceptibles and extreme resists have passed physical examination for Navy diver, which is notably rigid. Civilians who have made thousands of dives and have proved to be highly bends-resistant, might not be able to pass the physical requirements for Navy diver, on account of age, size, ear injuries, etc.

¹³Divers call anything at 100 feet or more deep work. Men who work every day in the year at sixty to seventy-five feet and think nothing of it, often refuse to go "deep" at all. Union diving scale is based on depth, anything down to sixty feet is minimum scale, with a dollar a foot for each foot in excess of sixty. Sixty feet would be a loss-ratio of 3 to 1 in case of sudden emergency ascent; many men have taken this ratio frequently with impunity, though it is not considered a safe ratio. The 8 to 1 loss-ratio occurs in emergency ascent from a 200-foot dive. I know one instance in which a diver tore a large hole in his dress at this depth. (Small holes are ignored, they merely get the underwear wet.) He came up in five minutes and didn't get bends. This should not be done if it can be avoided, but the chance of bends, with its .6% fatality rate, is much preferable to drowning, which has practically a 100% fatality rate.

cases of bends after deep dives.¹³

Pressure drops might be compared to falling off a fifty-foot ladder. You are not likely to get hurt very badly if you fall off the bottom rung. Fatal falls among structural steel workers have nothing much to do with it.

I hope the deep diving information has cleared up some confusion, and has been of interest for its own sake. But now let us proceed to more relevant matters—ascents from very shallow dives that provide near-parallels to the pressure-loss in the spaceship.

First, perhaps you might like to experiment yourself, to see how it feels to take the pressure-loss the crew would take under such circumstances. This will not be comparable in ratio of loss, but in total pressure lost on the surface of the body, about fifteen thousand pounds. That may sound alarming, but I promise it won't hurt.

Hunt up a swimming pool fifteen feet deep on the diving board end—you may have to resort to the ol' swimmin' hole. Don your trunks, dive off the board—remembering to experience weightlessness on the way to the water—touch the bottom of the pool, and come up. That's all. You have just shed fifteen thousand pounds of pressure. Aside from the fact that your chest expansion decreased as you went down, and some possible sensation in your ears, you didn't feel either the increase or decrease of external pressure. (And remember this next time you read that old hooey about tons of pressure bear-

ing down on a gear diver from every side, so often found in diving thrillers.)

To get a comparable ratio of pressure of gas within the body, to the external pressure upon ascent, the dive will have to be a little deeper, to about thirty feet. A good skin diver with no gear could get this effect while holding his breath. Skin divers in the South Pacific, after hyperventilating—a dangerous practice—go down one hundred feet for pearls. They sometimes get bends, which do *not* depend on whether or not you wear diving gear, but on the depth—ratio of loss in ascent—duration of the dive—amount of time the tissues have to saturate—the amount of exercise and emotional state—speed of saturation—and on inherent individual tolerance.

If you can't hold your breath long enough to go down thirty feet, I'll make the dive for you. I can't hold my breath that long, either—besides, I'm such a sissy I can't stand cold water—so I'll borrow my husband's two-hundred-pound diving gear. I'm not strong enough to stand up in this outfit on deck, but with a husky male supporting me on either side, I make it to the ladder. Once on the bottom, the weight of the gear is immaterial; gear plus diver plus air can be adjusted to weigh a few pounds more than the water displaced.

I adjust my specific weight to that of a man on the Moon. After I have practiced a few Moon-jumps, admired the bottom scenery, and tried with

singular lack of success to imitate my husband's trick of catching fish by hand, he reminds me a bit impatiently over the diver's telephone that he needs the gear to start work, and pulls me up by lifeline with no decompression. That is, no pause on the way up to give the body extra time to adjust to decreasing external pressure.

That's what I said—no decompression. A very un-athletic and fortyish female, who is certainly not a bends-resistant by any stretch of the imagination, can and has made ascents directly comparable to the pressure-loss ratio Mr. Ley fears may give able-bodied young spacemen an "often-fatal affliction." Furthermore, this practice is in full accordance with Navy decompression tables, which call for no decompression after dives to about thirty-nine feet, regardless of duration.

By this is meant an uninterrupted ascent at the rate of about twenty-five feet per minute, a loss in external pressure of about a quarter pound per square inch per second, which Mr. Ley might call a rapid ascent. This isn't as fast and exciting as the almost instantaneous ascent called ballooning up, which happens accidentally, particularly to beginners. Buoyed up by expanding air in his dress, the surprised diver shoots up with such speed and force that he pops partway out of the water, to fall back and float on the surface, spread-eagled by torque force, unable to bend his elbows to reach his valves. (How a diver extricates him-

self from this stiff-limbed predicament, should be of interest to manufacturers of spacesuits, but there is no room to deal with it here.¹⁴)

Most divers who balloon up live to tell about it—I knew one beginner who set some kind of record by ballooning up feet first nine times in one day. But ballooning up on purpose is not recommended, for reasons applicable to space, which we will consider a little later.

First I should like to say a few words about the lessons in applied psychology space-planners can learn from diving. I have dealt with bends factually and unemotionally, have showed that a mere female can take a two to one pressure loss with aplomb, in the hope of reducing among space-travelers to come the incidence of a very distressing ailment which seasoned divers call "psychological bends." It is common among novice divers who work themselves up into a fine state of apprehension, expecting to die every time they get a rheumatic twinge from sleeping in

¹⁴A leisurely and completely controlled floating up is something else again. It looks deceptively easy when an expert does it, but is utterly impossible to a beginner. It takes about 5000 hours practice in buoyancy control. (Navy divers are instructed to maintain distinct negative buoyancy during the ascent, to avoid ballooning up, but these floating ascents may be observed among marine products divers.) Such experts can actually remain suspended mid-way between bottom and surface, at neutral buoyancy, (a trick requiring as delicate a balance as walking a tight-wire,) by "bumping" the stem of the exhaust valve by reflex every few seconds. They can teach us much about orientation in space, particularly since deafness and impairment of vestibular function is one of the commoner occupational hazards of diving. The upside-down aspects of the novice who gets feet higher than valves are also of orientation interest.

a narrow bunk on a mattress dampened by sea water. The cause of psychological bends is reading too much over-sensationalized diving literature before doing any diving.¹⁵

An apprehensive mental state is bad medicine for divers, drivers, or spacemen. Every automobile driver knows—or should—that tension makes him an accident-prone. Navy diving training, dwelling as it does on all even remotely possible diving accidents before putting the student down ten feet in a tank of water, produces nervousness not encountered when an untrained civilian tender—or a diver's wife—makes a first dive after having watched a calm and even bored professional diver, come up day after day in as routine a fashion as an elevator operator.

Crews that are constantly worried lest they kill the diver can go to pieces in an emergency and actually do it. I am much more concerned about the presence of accident-prones on my husband's boat, than I am about the rather remote possibility of being made a widow by bends. His way of expressing this idea is to say that he doesn't get scared when some thing out of the ordinary happens on the bottom, but he sometimes gets scared that his crew might get scared.

A diver we knew, father of three

¹⁵This has an interesting corollary in diving. If the diver is calm, compression rests the heart, slowing beats as an oxygen tent does for critical heart patients. But fear speeds heart beat and respiration, increasing tissue saturation. So a diver who is afraid of bends (or anything else) is actually more likely to get bends than one who is not afraid, other things being equal.

small children, was killed recently on this coast for no other reason than that his crew allowed their mental processes to be paralyzed by panic. There were several ways they could have brought him up safely if they had stayed calm enough to think and act effectively.

I know at least a dozen instances in which divers have been brought up by the crew's presence of mind in similar emergencies, and are alive and diving today.

This man, by the way, was rather unusual among¹⁶ civilian professionals in that he was not at all bends-resistant. He didn't get bends from thirty-five-foot dives, of course, but he put on some nitrogen-absorbing fat, and got three bad attacks of bubbles after deeper dives, in each case recovering, but in one case only after a "soak" of forty-eight hours, which set an all-time record in the local recompression chamber. The point is that he survived repeated and severe attacks of bends, only to be killed by the psychological factor.

So if diving teaches the space-planners nothing else, I hope this one

thing gets across. A calm, collected, and self-confident mental state is the first and most important requirement for men who may have to deal with emergencies.¹⁷ Every word in space manuals should be weighed and reweighed for its psychological as well as informational effect. The youngster fresh out of diving school, with an encyclopediac knowledge of all the horrible things that could conceivably happen to him, buzzing around in his brain—and no knowledge of the pleasant aspects of diving to counteract it—at least usually has the advantage of going out to sea the first few times with an experienced diver, who will laugh off about half his fears and cut the rest down to size. Our first space crews will have only theory to go by, plus their native ingenuity. Let us leave this second component unimpaired by a long list of unlikely and even imaginary hazards to worry about.

And now I shall cease belaboring Mr. Ley, and tender my apologies. His contributions in his own specialty are, of course, invaluable, and his mistaken ideas about bends and diving are shared by the general public. I had similarly foggy notions about diving myself ten years ago, and my current ideas about rockets would sound ridiculous to Mr. Ley. The findings of many different specialties are needed to conquer space. Only because Mr. Ley's name carries so much weight in his chosen field, did

¹⁶A natural selection process goes on in civilian diving, the end result being that most men who have been in it any length of time are more or less bends-resistant. This does NOT mean that bends-susceptibles die off like flies, and it does NOT mean that a man gets more bends-resistant from experience. (He may even get less bends-resistant as time goes on since he gets older, his blood vessels may become more brittle, and he may put on fat.) It merely means that a man who gets bends easily has difficulty in making a living, and is likely to quit the business and do other work. In the Navy, of course, a diver gets paid whether he is in the tank or not, in fact, he gets paid whether he does much diving or not. No such luck for civilians.

¹⁷The Navy manual's word for it is "phlegmatic temperament."

I consider this rather elaborate refutation necessary. Since my name carries no weight at all, I could not issue a flat denial and expect you to believe it; I had to produce the supporting facts.

But I cannot with a clear conscience close an article on pressure-drops, without covering a matter Mr. Ley doesn't take up, but which every diver and prospective space-traveler should understand thoroughly, for his own protection.

Our previous discussion has been concerned with gas that was in the tissues or the venous system on the way out of the body when it expanded, causing bubbles during uninterrupted ascents from dives of over thirty-nine feet. The rest of our discussion, will be about air that is on the way into the body, either in the lungs or the aorta, the main trunk of the arterial system, when it expands. This has been known to occur in ascents from less than thirty-nine feet, and could occur in the spaceship if the pressure drop were fast enough.

It is less liable than bends to occur in diving, because the lungs don't contain air during exhalations, while the tissues contain gas at all times. (If they didn't, we would be crushed under the weight of the ocean of air surrounding this planet.) But when it does occur it is more liable than bends to result in death. Fortunately, foreknowledge contributes to prevention.

First we will consider incoming air under voluntary control, which it would be unless the ascent were so

extremely fast as to occur in less time than it takes to exhale on purpose. The lungs will stand only a very slight pressure-differential over the surrounding medium; some authorities give three pounds per square inch and others two pounds per square inch as the limit.

In other words, though you probably wouldn't get nitrogen bubbles from the loss of half the air pressure in the spaceship, your lung tissues could be damaged if you held your breath while the external pressure dropped only about one-eighth.

You could safely hold your nose on your way up from the bottom of the swimming pool; you had compressed air in your lungs while on the bottom—it was compressed by the water pressure on the outside of your body—when you came up it expanded, but not to a greater volume than your lungs could contain. But if you had been breathing PRE-compressed air from a hose, the situation so far as your lungs—but not your tissues—are concerned, would have been different.

The full-gear professional diver deliberately continues regular breathing during an ascent, though he may pay no conscious attention to the frequency of his respirations while on a level bottom. The sport diver is warned against the practice of ducking out of an open-bottom helmet "just for fun" and against shedding his bottle-supplied mask and swimming to the surface without it. The reason he is warned, is that there is a natural instinct to hold the breath

while underwater without gear, or indeed in any situation where a shortage of air seems imminent. Unless he exhaled intentionally and sufficiently, he would reach the surface with a nosebleed or worse, possibly much worse.

That breath held forcibly while external pressure drops could damage the lungs, should be obvious to anyone who has studied elementary physics; the subject of nitrogen bubbles in the blood is esoteric by comparison. But I go into breath-holding in detail, because some science-fiction devotees don't seem to have considered this relatively simple matter.

Not long ago, I watched a drama set in a spaceship, on TV. It was supposed to be an adult program, not the Buck Rogers variety. One of the spacemen decided to commit suicide. He opened a door on the set—if this represented an air lock both valves were opened simultaneously, for the darkness of space was visible beyond. The other two crewmen watched in horror as their companion hurled himself into the void. I preferred to watch the manly chests of the supposed survivors. Sure enough—both held a deep breath, hanging onto the air in their lungs while the cabin supply was supposedly escaping into space. Only when the door was safely closed again, did the actors exhale in relief and take another breath. If this were real, of course, the pressure drop would be fast and material. Their lungs would have burst like toy balloons blown up beyond capacity. So

instructions to exhale when instinct dictates holding the breath, should be included in every student spaceman's training.

In rather rare instances, when a diver has ballooned up with great speed, even though he may have partially exhaled during the ascent, the expansion of air in his lungs was sufficient to force air into the lung capillaries and the left side of the heart, causing in the aorta a different kind of bubble called air embolism. He might hardly have time to think of exhaling; an involuntary gasp of surprise at being suddenly deprived of his footing on the bottom, by excess buoyancy, could do the trick. Depending on their volume such bubbles to a greater or less extent block the distribution to the system in general, of air from subsequent breaths at lower pressures, and so death would be more likely than with nitrogen emboli, which impede circulation only in that part of the body where they happen to be located. Death from air embolism would be a form of suffocation.

Allow me to re-iterate here, that fatal air embolism does not occur in every abrupt and involuntary ascent, by any means, or few student divers would live to graduate. Most novices lose control of their buoyancy at least once—particularly if using the excessively buoyant Navy Mark 5 helmet, which is not in favor with open-sea divers who work in rough water, and prefer less buoyant "pots." Seasoned divers watching novices in action are inclined to regard ballooning

up as a joke rather than as a potential tragedy. No statistics are available as to how many times divers balloon up to every case of air embolism, but offhand I would guess that it is about as likely as fracturing the skull on the bottom of the boat, which has also been known to happen in involuntary ascents. It is difficult to explain air embolism at all without exaggerating its likelihood by the space devoted.

The treatment for air bubbles is the same as the treatment for the more common nitrogen bubbles—recompress the diver. If he were unconscious, as he would be if there were enough bubbles in the aorta to cut off a large part of the oxygen supply to the brain, it would not be practicable to put him underwater again, unless another diver were on hand to adjust his valves below. The best treatment would be the recompression chamber. Civilian diving boats seldom have chambers aboard, and it may take an hour or even two to summon a Coast Guard plane by radiotelephone, and fly the man to a Navy recompression tank a hundred miles or more away. This is done when a civilian diver has a bad case of bends, and usually means merely that his pain is prolonged by the trip, before he reaches the relief the cham-

ber provides.¹⁸ But if he had an air embolism, the delay could cause his death.

If the pressure-loss in the spaceship cabin were very sudden—and the holes were still sealed short of the critical low pressure at which blood would boil—and if one of the spacemen, caught between exhalations, were to get air emboli, or for that matter, if the loss were in a ratio of over 2.25 to 1, giving him nitrogen emboli, he would be in a singularly fortunate position, compared to a diver in the same fix.

The important distinction—aside from the much greater loss-ratios possible in diving—is that the diver on deck remains at the minimum pressure experienced, while, after the repair, the spacemen would return to the maximum pressure experienced, and remain at that pressure indefinitely.

In other words, it would not be necessary to move the spaceman to get him into a chamber far more commodious than any provided for divers, and automatically recompressed to the greatest pressure experienced during his "dive." An attack of either kind of bubbles, if it occurred, could be expected to last only a brief interval. Since the onset of symptoms in diver's bends is sometimes delayed for minutes or even hours after inadequate decompression, our spacemen might even be recompressed before they had time to find out whether they had nitrogen bubbles or not!

And spacemen's wives would never

¹⁸In relatively few instances, do nitrogen bubbles press on nerve tissue enough to cause permanent damage, and these instances, I repeat, involve loss-ratios that are very large compared to what a space-crew would take. One source goes so far as to say "pains invariably pass off" upon recompression, but one exception in a thousand cases could make me a liar if I said "invariably."

sit home worrying because their men had taken off on a trip with no recompression chamber aboard. For the recompression chamber, of course, would be the spaceship cabin itself. This rather obvious point, seems to have escaped general attention, to judge from the way that hoary old chestnut, "space bends" keeps cropping up in science fiction. It all goes to show that not many writers of science fiction, are wives of divers.

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* * *

Other technical information from Jake Jacobs, diver.

THE END

THE ANALYTICAL LABORATORY

The score sheet below doesn't reveal, in its statistical averaging, a decidedly unusual, and very interesting effect that showed up this time. Ray Jones' "The School" took first place—but the vote was almost solid 1's; "Care and Breeding of Pigs," by Rex Jatko took second—with an almost solid line of 2's. And "Special Effect" had an almost solid line of fifth place votes. The contested spot seems to have been the third-fourth place argument over "Eight Seconds" and "Pack Rat Planet."

Incidentally, the comments on "The School," over and above the place-votes, were very strongly favorable. Apparently, a lot of the readers feel, as does Jones, that the homeostasis effect of modern educational techniques is extremely frustrating.

But the score sheet comes out this way:

PLACE	STORY	AUTHOR	POINTS
1.	The Care and Breeding of Pigs	Raymond F. Jones	1.38
2.	The School	Rex Jatko	2.42
3.	Pack Rat Planet	Frank Herbert	3.00
4.	Eight Seconds	M. C. Pease	3.30
5.	Special Effect	J. Anthony Ferlaine	4.85

THE EDITOR.



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BY P. SCHUYLER MILLER

S.F. IN 3-D

We have stayed away from gimmicks and gadgets in this department, though it would have been easy, while commenting on the upsurge in juvenile science fiction, to talk about the host of space cutouts and push-outs and kits and models which fill the toy stores, inspired more by television than the science fiction we know.

However, a gadget which showed up in last week's mail is irresistible, more for the possibilities it offers than for what it now is. Briefly, View-Master is telling an unimportant little tale about Tom Corbett, Space Cadet, in a series of twenty-

one very effective three-dimensional table-top tableaux. Science fiction, even of an elementary kind, has gone 3-D—and the transformation works.

View-Master—a trade-mark of Sawyer's, Inc., Portland, Oregon—has come a long way since I bought one for a niece five or six years ago. Slightly different views, one for each eye, are made by a stereo-camera on color film and mounted on a special disk which slips into the viewer. The View-Master library now runs to several hundred scenic views, a number of nature-study reels, and a growing number of story-sequences for children. The first of these used the crudest of models and were pretty terrible, but the new Tom Corbett adventure

in twenty-one scenes—he follows the trail of a mysterious pyramid to the Moon and Mars, then to the asteroids—has some extremely well done and imaginative shots in space, and one very good one of alien creatures done with a Hannes Bok touch. Florence Thomas, who is credited with creating the scenes, herewith rates among the good science-fiction artists. (Their older "Sam Sawyer" reels are strictly for the kiddies.)

I don't suppose many of you will want to rush out and get View-Masters for yourself in order to see these twenty-one scenes, though you could do worse than present one to a youngster who has a birthday coming up. However, several possibilities do suggest themselves which might make 3-D in general and View-Master in particular of more interest to active fans.

In the first place, and with all due respect to Miss Thomas, Messrs. Sawyer might substantially increase their potential among both children and adult fans if they were to run down to Hollywood and investigate the possibility of making View-Master reels from some of the best science-fiction motion pictures. If they had been able to make 3-D stills during the shooting of "Destination Moon" or "When Worlds Collide" or "War of the Worlds," I would be recommending them to you without reservation.

In the second, they are already using View-Master to illustrate at least three books of science: "Mushrooms in Their Native Habitats," by

Alexander H. Smith (33 reels, 231 views, 626 pages); "Succulent Plants," by W. Taylor Marshall (20 reels or 140 pictures of cacti); and "Alpine Wild Flowers of Western United States," by Howard R. Stagner (10 reels, 70 pictures). What price an astronomical text with 3-D views of the planets and star-sys-

tems?

In fact, what price a 3-D series of table-top planetary views, with or without monsters, made by fans in the manner of the very effective models we used to see photographed in *Science Fiction Advertiser*?

You're not limited to View-Master in this, of course, though they do sell their own camera—a pretty good one, I'm told, and by no means cheap, with a number of special features to make picture-taking easier and more foolproof. The camera—which you can find out about at your nearest camera store—has a highly ingenious gadget for taking one series of pictures down one side of ordinary 35-mm. color film, then going back down the other side—which gives you twice as many pictures per roll as other stereo cameras. There's a kit for mounting the pictures in cardboard reels, and the View-Master stereoscope costs only \$2.00—with illumination—to \$4.00 or \$5.00—with batteries or a plug-in transformer.

But stereo photography, using the current 35-mm. color films, is growing up fast and if you're interested in table-top science-fiction sequences here is what seems to me an ideal

way of having a lot of fun. There are several very good cameras available, with which high-grade work can be done—this summer I saw for myself what one of them can do to make stratigraphy stand out in archeological excavation.

Allan Nourse's short amateur motion picture of Matheson's "Born of Man and Woman" is a very effective and imaginative job. The *Science Fiction Advertiser* photos showed that someone is doing excellent other-world table-tops. How about 3-D and color?

* * *

Incidental Intelligence: Speaking of Tom Corbett, which I gather is about the sanest and best produced of the TV space operas (Willy Ley is technical adviser—or was, last time I heard), I suggest that you try your library for a book on advertising, "The Relaxed Sell," by Thomas Whiteside (Oxford, \$3.50). It has a chapter, "No Lobster Men from Neptune," which is an eye-witness account of a Tom Corbett rehearsal and planning session, and good fun all around.

You may also be interested to know that Werner von Braun's "Mars Project" has been selected by the American Institute of Graphic Arts as one of the "50 Books of the Year" for 1953. These selections are made on the basis of fine typography and book-making; apparently the oversize margins that I objected to caught the eye of the artists. It's a

handsome little book, now on tour of libraries and museums throughout the country.

* * *

New Yorkers may have seen in the New York *Times* of November 16th the obituary of A. Hyatt Verrill, who died at his home in Chiefland, Florida, on November 14th, aged 83. The Fantasy Press edition of his "Bridge of Light" was about all that science fiction has had from Mr. Verrill in recent years, but in the days of the early *Amazing Stories* he was one of the giants in the field. The Day "Index to the Science-Fiction Magazines" lists twenty-eight stories published between 1926 and 1939.

A. Hyatt Verrill was one of the most prolific and successful writers of our time. The current "Who's Who"—the British edition, which appreciates such old-line scholarship—lists only a fraction of the one hundred and fifteen books he had written, and I would guess the number to be more like two hundred if new editions and foreign translations are counted. I credit his fascinating lost-race stories, his many books on the colorful aspects of the American Indian civilizations, and his articles in innumerable newspapers and magazines for arousing my own interest in archeology as a scientific hobby.

The son of one noted biologist, Addison Emery Verrill, and named for another, Alpheus Hyatt, A. Hyatt

Verrill followed his graduation from Yale by work as a naturalist and illustrator, meanwhile exploring in the West Indies and in South and Central America. He is credited with having discovered many new species of marine shells and having rediscovered the supposedly extinct Solenodon in Santo Domingo, in 1907. In 1951, at the age of eighty, he found what he believed to be the lost "Wari Wilka" of the Aztecs or Warracabra Tiger of the present Indians, in southern Mexico.

If he emphasized the strangeness of the world in his books, it was because he wanted his readers to feel a little of that same wonder that the jungle and the sea bottom, the past and the unknown present gave him. As you know, he was exploring new mysteries when he died, seeking Old World origins for some of the stranger aspects of the American civilizations.

Today's science fiction may be more real and psychologically truer and more plausible than the brightly colored tales of the '20s, but they lack some of the magic that men like A. Hyatt Verrill and A. Merritt and Edgar Rice Burroughs put into their stories. We can use a few more romantics like them in our magazines and books.



THE ALTERED EGO, by Jerry Sohl. Rinehart & Co., New York. 1954. 248 pp. \$2.50.

Here's Jerry Sohl's best book since "The Haploids" and a pretty success-

ful blend of science fiction and detection.

In a future era when the world's most valuable citizens may be "restored" after death, when the officials of the World Federation recreate a new body and mind from the recorded patterns of the old, dilettante Carl Kempton discovers that his murdered father has been restored with someone else's mind. Who the new "Bradley Kempton" is he soon discovers, but what has happened to his father's ego, how the thing was accomplished and why, and who is behind it all are the puzzles he must work out.

Like nearly every sf-detective blend, this doesn't quite live up to the standards of the best mystery fiction of the day. It's of the "had-I-but-known" school, derided by most reviewers, where the whole thing would be cleared up quickly if our hero told half he knew to the police. But top-selling mystery writers get away with it, year after year, so why shouldn't Mr. Sohl?



THREE THOUSAND YEARS, by Thomas Calvert McClary. Fantasy Press, Reading. 1954. 224 pp. \$3.00.

Here's a highly popular serial which appeared in these pages in 1938, thoroughly rewritten and updated, and not as archaic as you might suppose. It reminds me most of the earlier "John Taine" books, but has some virtues all its own.

Super-scientist Simon Gamble and

super-tycoon Vincent Drega, each an ultra-egoist in his own line, clash head-on over the use to be made—or not made—of Gamble's discoveries and inventions, which he believes will "free" mankind from all toil and discomfort. To prove his point, he puts the world into suspended animation for 3000 years—a decimal point slipped somewhere. Then, as Drega tries to build a new society on the roots of the past, utilizing the pooled skills of the people at hand, Gamble tries to create his scientific utopia.

It's crude, perhaps, and some of the effects of the 3000-year sleep probably won't stand the test of present-day standards of plausibility. (Why do concrete and metals crumble and flesh survive? How can plants go on growing while animal life is suspended?). But there's a real fascination about the way the story works out, and neither Drega nor Gamble is the all-black or all-white character we were used to in those days. Too bad the book wasn't published earlier: it has to measure against tougher competition now, and especially against the standards of readers who can't take the old yarns at their own pace and valuation.



BRAIN WAVE, by Poul Anderson.
Ballantine Books, New York.
1954. 166 pp. 35¢.

This original novel, which so far as I know is Poul Anderson's first—aside from some shortish serials—

tells a panoramic story of what happens to a world gone super-intelligent.

The Solar System, one day not too far ahead, swims out of a zone in space in which an inhibiting field has stifled many kinds of electrical phenomena, including those which control the speed of mental processes. Ordinary men and women find themselves with IQ's of 150 or more, morons begin to cogitate, animals have the intelligence of former morons—and society just about shakes itself apart in the upheaval that follows.

It's a brilliant idea that somehow doesn't quite come off—which may be the reason Ballantine has skipped the usual hardcover edition. We follow various sets of people, and the mosaic of points of view may detract from the overall effect. Be that as it may, one of the intertwined stories is developed as well as anything Poul Anderson has done: the quiet adjustment of the feeble-minded Archie Brock who of them all builds a stable new society among animals and men. I'll remember Archie.



THE IMMORTAL STORM, by Sam Moskowitz. ASFO Press, Atlanta. 1954. 269 pp. Ill. \$5.00.

We devoted a good deal of space, three years ago, to the original mimeographed edition of Sam Moskowitz's "History of Science Fiction Fandom." Now the original chronicle has been amplified by some fif-

teen thousand words and published in a very well printed, offset-printed book with quantities of illustrations of the bright lights of organized fandom, taken from the snapshot collections of the author and Robert A. Madle—and with a seventeen-page index.

The publishers, Atlanta Science Fiction Organization Press, are to be commended for putting out a book that's more attractive typographically than some from regular publishers. The work involved certainly ranks second only to the Day "Index." And, although the focus is still too closely on the New York-New Jersey sector of Fandom to make this history really definitive, "The Immortal Storm" is and will be *the* panorama of fandom from 1926, when *Amazing Stories* reached the stands, to the end of 1939.

If you're serious about science fiction as a movement, you'll have to have this, however violently you may at times disagree with its author's point of view. The index alone is probably worth the price to capital-F Fans. And since ASFO naturally hasn't the distribution channels of regular publishers, send your check to their treasurer, Carson F. Jacks, 713 Coventry Road, Decatur, Georgia.



SATELLITE E ONE, by Jeffery Lloyd Castle. Dodd, Mead & Co., New York. 1954. 223 pp. \$3.00

Here is another of the semidocu-

mentary stories of the first venture into space which Clarke's "Prelude to Space" and Kornbluth's "Takeoff" represent to most of us. It isn't quite up to their level, but it's a good job.

This is the story of the establishment of the Earth's first space station, told over fourteen years and on three levels. The first story is that of Sir Hugh Masterson who was aboard the first manned rocket which carried the core of Satellite E-1 from the Australian launching ground into an orbit one hundred and twenty miles out.

A mischance trapped him there, and the second protagonist, the pilot Johnnie Downes, went up to rescue him.

The last two-thirds of the book are the story of Sir Hugh's nephew, Hamer Ross, who fourteen years later became a member of the crew of the satellite at the moment when it was at last ready to be diverted into an equatorial orbit.

On the surface, this is a dead-pan account of the fascinating mechanics of putting such a satellite into space and of living and working in it, once it is there. Under that are the very different reactions of the three very different men, and the problems which these reactions pose for them.

We have a developing science of space medicine: we will also need one of space psychology before Man can confidently lift himself by his bootstraps and walk among the stars.

TOMORROW IS ALREADY HERE, by Robert Jungk. Simon & Schuster, New York. 1954. 241 pp. \$3.50.

Here is a disturbing portrait of 1954-America by a German-born Swiss journalist who says that Harrison Brown's regimented industrial society is already with us.

In a series of vignettes of people in all parts of the country—at White Sands, at Alamagordo, in the new industrial South, in Manhattan's TV stations, in dozens more—the author sees an America where the importance of the individual is fast being swallowed up by the importance of the machine, the statistic, the society. It is a world where electronic "brains" may be used to make governmental decisions, where psychological probes and birth-to-grave spying are used to separate employees who may deviate from the safe and stable median in behavior, where men come to regard themselves as statistics. It is, in other words, the world of "1984" and "The Space Merchants," already in the making.

I think Jungk's European background makes him misread many of these things: certainly some of the reported conversations sound as if he were remembering them rather than transcribing what he actually heard, and that always makes for conscious or unconscious distortion. But it's a disturbing picture just the same, especially if you read it with the last third of Brown's "Challenge of Man's Future." Is that kind of tomorrow already here?

THE BEST SCIENCE-FICTION STORIES: 1954 edited by Everette F. Bleiler & T. E. Dikty. Frederick Fell, New York. 1954. 316 pp. \$3.50.

PORTALS OF TOMORROW, edited by August Derleth. Rinehart & Co., New York. 1954. 371 pp. \$3.75.

There are now two annual collections of "best" science fiction short stories: the Bleiler-Dikty selection, in its sixth volume, and the first of a series of selections by that veteran critic and writer, August Derleth. And—which may be partly a question of who gets first whack at a story—they don't overlap. Both books, incidentally, offer bonuses this year: Bleiler-Dikty an index of their choices since the 1949 volume, Derleth with a list of all fantastic short stories published in American magazines in 1953. To collectors, that latter feature may be worth the price of the book, no matter what you think of Derleth's taste in science fiction.

That we are dealing entirely with differences in taste is shown by the fact that Derleth stars only *one* of the thirteen Bleiler-Dikty selections as "outstanding" in his roster for the year. That is J. T. M'Intosh's "One in Three Hundred." On the other hand, since he is also including fantasy with his science fiction, his choices represent more magazines.

If I were buying only one anthology a year, I think I would be safe in waiting for the Bleiler-Dikty collection, and "1954" is no exception to the excellence of previous years. You may have stories you'd rather

hi!

Any moment, now, it will happen...a little hand reaching...a puppy-tail wagging...and suddenly a boy and his new dog will be tumbling together in the beginning of love.

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see here, but the editors apparently try to achieve balance along with excellence. Fritz Leiber is in twice, with as different tales as his grim "A Bad Day for Sales" and his Saroyan-Bradbury vignette "The Big Holiday." (Wasn't Leiber in the field first? Maybe Bradbury is like him.) The others: Jack Vance's "D. P!", the rather trivial Gordon Dewey-Max Dancey "The Collectors"; Joseph Shallit's variation on a familiar theme in "Wonder Child"; Walter M. Miller's picture of man's adaptation to Mars, "Crucifixus Etiam"; and William Morrison's wryly humorous "The Model of a Judge," in which an alien judges an interplanetary cake-baking contest. With them: Richard Matheson's disturbing "The Last Day"; Alfred Bester's study of future psychosis, "Time is the Traitor"; Ward Moore's subtle and memorable "Lot"; a somewhat over-stereotyped, tongue-in-cheek "Yankee Exodus," by Ruth M. Goldsmith; and --from this magazine, like the Walter Miller story--"What Thin Partitions," by Mark Clifton and Apostolides.

August Derleth's choices, on the other hand, seem to me to hew more to old-line themes and treatment. To dispose of the pure fantasies first, in the collection of sixteen stories there are Ray Bradbury's much-reprinted "The Playground"; Frederic Brown's little comedy, "Rustle of Wings"; a borderline case in Mildred Clingerman's "Stickney and the Critic"; and T. L. Sherred's enjoyable "Eye for Iniquity"; with James Blish's "Testa-

ment of Andros" as a possible fifth if you assume a framework of reincarnation as the explanation of its bewildering shifts in viewpoint.

The science-fiction segment of the collection then consists of John Anthony's "The Hypnoglyph"; R. Brettonor and Kris Neville's farce of Cuddlypets, "Gratitude Guaranteed"; Arthur C. Clarke's "The Other Tiger"; another Clifton-Apostolides collaboration, "Civilized"; with Mildred Clingerman's "The Word"; John Langdon's very old-line "Hermit on Bikini"; Murray Leinster's second farce about Mr. Binder and his inventions, "Jezebel"; Mack Reynolds' "DP From Tomorrow"; Idris Seabright's "The Altruists"; Robert Sheckley's "Potential," from this magazine; and Clifford D. Simak's "Kindergarten."



THE STARS ARE OURS, by Andre Norton. World Publishing Co., Cleveland. 1954. 237 pp. \$2.75.

If science fiction is in danger of sacrificing itself to the lit'ry wing of our society, there's always Andre Norton—who, Messrs. Conklin and Boucher please note, is science fiction's other "best" woman anthologist—to provide a stirring adventure story in the good old mood, but told with thoroughly modern deftness and smoothness. This is another teen-age book which, like Robert Heinlein's, is better than some "adult" fare.

It's a story of the end of the Twenty-fifth century, when anti-sci-

ence has driven the Earth's scientists and their descendants into hiding. Dard Nordis is its hero: his biologist brother has found the secret of frozen sleep which makes escape to the stars possible for the last large community of Free Scientists. Lars is killed, but Dard escapes with his six-year-old niece, Dessie.

Dard's story is broken in two parts: his escape to the Free Scientists, his trip to the city of the Peacemen to use their great computer, the battle to get the starship away—then the awakening on another world and the adventure of discovering its creatures, its dangers, its history and its people. This isn't quite up to the author's "Star Man's Son" or "Star Rangers," but it's the kind of book that will win science fiction a lot of friends and maybe bring back some old ones.



THE SECOND GALAXY READER OF SCIENCE FICTION, edited by H. L. Gold. Crown Publishers, New York. 1954. 504 pp. \$3.50.

If Horace Gold continues to pull fatter and fatter anthologies out of the pages of *Galaxy* there will be no point in his publishing the magazine at all: he can simply issue it as an annual shelf of books.

This seems a bigger book than the first "Galaxy Reader," though it isn't, and there are only thirty-one stories here compared with thirty-three in the first collection. The difference is probably in the fact that a dozen out

7 PALMER TRAINED

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Look at This Record

In checking over some files recently, I discovered that in a 6-month period, seven of our students and graduates had won \$1800 in prize competitions, including:

1. Mrs. A. L. F. of N. Y., won \$500 in a *Modern Romances* competition. 2. Ray T. Thompson, of Edmonton, Canada won \$100 in *New Liberty's* Short-Story contest. 3. Harold A. Seward of Easton, Pa., won \$500 in the Freedom League's Competition. 4. Mrs. Helen Hadley of Greenfield, Iowa, won \$100 and 5. Mrs. Lucille B. Lewis of Anna, Ill., won \$250, and 6. J. M. of Montana won \$100—all three in *MacFadden* Contests. 7. Mrs. Pauline B. Watson of Beaumont, Texas, won \$250 in a true story contest.

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of this lot are longish novelettes: such stories as Robert Heinlein's "The Year of the Jackpot" and James Blish's "Surface Tension," Isaac Asimov's "The C Chute" and Clifford Simak's "Junkyard." It doesn't seem to be quite as good a collection as the first, but that may be because the stories are more recent and, therefore, more familiar, or—more likely—because quite a few of them are in other people's anthologies, so that this makes the third or fourth re-reading for me within a few months.

If the stories were a little older, there would be no question about this being a "must" since most of the best straight science fiction of

the last few years has been appearing either here or in *Galaxy*. If you don't ordinarily read Gold's magazine, it is a must. If you do, you can almost afford to buy these "Readers" and throw away your file of the magazine.



THE EXPLORERS, by C. M. Kornbluth. Ballantine Books, New York. 1954. 147 pp. 35¢.

Why Ballantine hasn't issued a hard-cover edition of this short-story collection, I don't know: maybe short-story collections are bad news to pocketbook publishers, even when they are as good as this one.

Of the nine stories in the collection, the first, "Gomez," is new. It is the story of a Puerto Rican genius with human values if inhuman intelligence. "Thirteen o'Clock" is a rollicking fantasy in the best *Unknown* mood and style, and "The Rocket of 1955" is a two-page trifle. You probably remember the story of the Heralds, "That Share of Glory," which was here in 1952, and you've undoubtedly seen "The Mindworm," that little classic of the monster-child, in various anthologies. "The Altar at Midnight" is a simple little tale of human reactions to space flight, as is "The Goodly Creatures"—which has touches of the advertising world of the Kornbluth-Pohl "Space Merchants." "Friend to Man" is a macabre little tale of an alien world, and "With These Hands" is my personal favorite in the book, projecting the plight of the creative artist in a wholly mechanized world.



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(Continued from page 7)

design, can be made predictable and definable. The moment the job can be fully specified—a machine *can* do it. It's then just a question of economics as to how soon it will.

The one kind of work a machine can't be designed to do, is a job that hasn't been thought of yet. That's why it can't be made to do design engineering—yet. We cannot, as of now, define what we mean by "creative thinking." When we can, at that moment it becomes theoretically possible to design a machine to do it.

Once, metallurgy was an art; now it's a science. Which means, in essence, that we can now define it and teach it to any apt student—and that, furthermore, we can set up a system of tests that can distinguish the apt student.

Currently, Mankind has an acutely serious problem. It is a fact that you can take the five-year-old son of a wild Tartar nomad, and in the course of twenty years of definable educational processes, turn him into a competent thermonuclear weapon technologist. He will, then, be competent

to control, in the physical sense, a thunderbolt that would have sent old Jove scrambling, white-faced and trembling, for the nearest shelter. He has at his control the powers of a demi-god. But he has the moral-ethical conceptions of a wild Tartar nomad, because that particular field can't, as yet, be taught.

Two thousand years ago, Plato said that Virtue couldn't be taught—it could only be demonstrated. We've made rather astonishingly little progress along that line in the intervening two millennia. However, the present situation of the world reminds me of a phrase an old Finnish-American farmer, in the Upper Peninsula of Michigan, used. He was talking to a younger man, who protested that a certain job was one he couldn't do. It was impossible. "You *has* to can!" the old man said.

Teaching "virtue"—or ethical good sense—has been called impossible. I submit the Finnish-American farmer's phrase applies; "We *has* to can!"

Psychologists say that it will take time to solve the problem of human personality—that solving it quickly

is impossible. Sorry. The problem of teaching physical science has been solved magnificently; whether solving the problem of personality is impossible or not—we has to can.

In most of living, it's not merely a matter of getting the right answers. The problem is to get the right answer *soon enough*. Hindsight is invariably better than foresight—but it's foresight, not hindsight, that keeps you alive. In the present case, it doesn't matter in the slightest whether I, as an individual, am being improperly impatient in seeking to hurry the social scientists; maybe I am. But, to misquote Lewis Carroll, "Won't you walk a little faster," said the whiting to the snail,

"There's an atom close behind me,
and he's treading on my tail."

I have a hunch that we've reached the end of the road on the business of physical weapons.

But that I'm not alone in considering the interesting implications of a set of social sciences—psychology

and sociology and the rest—that were real, engineering-type predictable sciences. After all, it doesn't matter a bit what weapons the other fellow has, if you have a weapon that makes it impossible for him to *want* to use it!

Perhaps a culture can become satiated with engineering achievements, somewhere along the line—and seek a new, totally different kind of frontier to explore. How would it look, from within such a society, when that change first began to gather momentum, I wonder? Probably, at first, it wouldn't be a conscious decision, a conscious policy—just a gradual drifting away toward new territories.

Certainly, it would be exceedingly difficult to determine whether the move was wise or not—except, as usual, by that wonderful, almost infallible method called hindsight. At the time, no doubt, it would appear a most frustratingly confused period of history.

THE EDITOR.



Yes! This \$2.95 Science-Fiction Best-Seller Yours for Only 10¢ with membership



Continued from Back Cover

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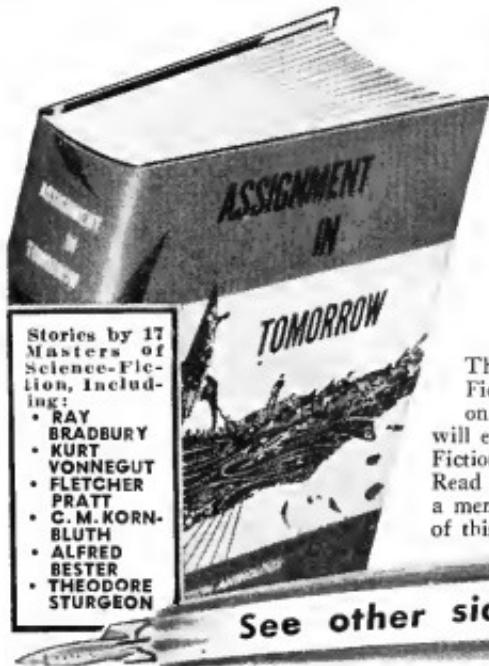
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